

Faculty of Engineering & Technology

P.K.University

Shivpuri (MP)



**Evaluation Scheme & Syllabus for
Diploma- Agriculture Engineering
(I to VI Semester)
(Effective from session 2019-20)**

EVALUATION SCHEME

SEMESTER I

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
DAG -101	FOUNDATIONAL COMMUNICATION	30	70	25	25	150
DAG -102	APPLIED MATHEMATICS -I(A)	30	70	NA	NA	100
DAG -103	APPLIED PHYSICS-I	30	70	25	25	150
DAG -104	APPLIED CHEMISTRY	30	70	25	25	150
DAG -105	ENGINEERING DRAWING	30	70	NA	NA	NA
DAG -106	AGRICULTURAL SCIENCE	30	70	25	25	150

SEMESTER II

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
DAG -201	APPLIED MATHEMATICS -I(B)	30	70	NA	NA	100
DAG -202	APPLIED PHYSICS-II	30	70	25	25	150
DAG -203	APPLIED MECHANICS	30	70	25	25	150
DAG -204	MATERIAL & CONSTRUCTION TECHNOLOGY	30	70	25	25	150
DAG -205	WORKSHOP TECHNOLOGY	NA	NA	25	25	100

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I Year I Semester

DAG -101 FOUNDATIONAL COMMUNICATIONS

SECTION "A" (ENGLISH)

1. PARTS OF SPEECH:

- a. Noun
- b. The pronoun: Kinds and Usage
- c. The adjective: Kinds and Degree
- d. Determiner: Articles
- e. The verb: Kinds
- f. The Adverb: Kinds, Degree and Usage
- g. Prepositions
- h. Conjunctions
- i. The Interjections
- j. Subject: Verb Agreement (Concord)

2. VOCABULARY BUILDING:

- a. Antonyms and Synonyms
- b. Homophones
- c. One word substitutions
- d. Idioms and Phrases
- e. Abbreviations

3. Grammar

- a. Sentence & its types
- a. Tenses
- b. Punctuations
- c. Active and Passive voice
- d. Transformation of Sentences
- e. Synthesis of Sentences
- f. Direct and Indirect Narrations

4. DEVELOPMENT OF EXPRESSION (Composition):

- a. Paragraph Writing
- b. Essay Writing
- c. Proposal Writing
- d. Letter Writing (Formal, Informal, Business, official etc.)
- f. Report Writing

SECTION "B" (Hindi)

5. संज्ञा, सर्वनाम, विशेषण, क्रिया विशेषण, वर्ण समास, संधि, अलंकार, रस, उपसर्ग प्रत्यय 1
6. पत्र लेखन, निविदा संविदा, दर आमंत्रण (कोटेशन) अपील, स्वतंत्र अपील, प्रतिवेन्दन अपील, प्रेस विज्ञप्ति 1
7. वाक्य/वाक्यांश के लिए शब्द, पर्यायवाची या समानार्थी शब्द, विलोम शब्द, अनेकार्थी शब्द, शब्दयुग्म या समुच्चरित शब्द समूह, वाक्य बुद्धि, (शुद्ध अशुद्ध वाक्य), मुहावरे एवं लोकोक्ति 1

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I Year I Semester

DAG -102 APPLIED MATHEMATICS I(A)

1. ALGEBRA-I:

1.1 Series : AP and GP; Sum, nth term, Mean.

1.2 Binomial theorem for positive, negative and fractional index (without proof). Application of Binomial theorem.

1.3 Determinants : Elementary properties of determinant of order 2 and 3, Multiplication system of algebraic equation, Consistency of equation, Cramer's rule

2. ALGEBRA-II:

2.1 Vector algebra : Dot and Cross product, Scalar and vector triple product.

2.2 Complex number : Complex numbers, Representation, Modulus and amplitude Demoivre theorem, its application in solving algebraic equations, Mod. function and its properties..

3. TRIGONOMETRY :

3.1 Relation between sides and angles of a triangle : Statement of various formulae showing relationship between sides and angle of a triangle.

3.2 Inverse circular functions : Simple case only

4. DIFFERENTIAL CALCULUS - I :

4.1 Functions, limits, continuity, - functions and their graphs, range and domain, elementary methods of finding limits (right and left), elementary test for continuity and differentiability.

4.2 Methods of finding derivative, - Function of a function, Logarithmic differentiation, Differentiation of implicit functions.

5. DIFFERENTIAL CALCULUS -II :

5.1 Higher order derivatives, Leibnitz theorem.

5.2 Special functions (Exponential, Logarithmic, Inverse circular and function), Definition, Graphs, range and Domain and Derivations of each of these functions.

5.3 Application - Finding Tangents, Normal, Points of Maxima/Minima, Increasing/Decreasing functions, Rate, Measure, velocity, Acceleration, Errors and approximation.

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I Year I Semester
DAG -103 APPLIED PHYSICS-I

1. UNITS AND DIMENSIONS (4 MARKS)

S.I. Units & Dimensions of physical quantities, Dimensional formula and dimensional equation. Principle of homogeneity of dimensions and applications of homogeneity principle to: (i) Checking the correctness of physical equations, (ii) Deriving relations among various physical quantities, (iii) Conversion of numerical values of physical quantities From one system of units into another. Limitations of dimensional analysis.

2. ERRORS AND MEASUREMENT (4 Marks)

Errors in measurements, accuracy and precision, random and systematic errors, estimation of probable errors in the results of measurement (Combination of errors in addition, subtraction, multiplication and powers). Significant figures, and order of accuracy in respect to instruments,

3. CIRCULAR MOTION (5 MARKS)

Central forces. Uniform Circular motion (Horizontal and Vertical cases), angular velocity, angular acceleration and centripetal acceleration. Relationship between linear and angular velocity and acceleration. Centripetal and centrifugal forces. Practical applications of centripetal forces. Principle of centrifuge.

4. MOTION OF PLANETS AND SATELLITES (5 Marks)

Gravitational force, Acceleration due to gravity and its variation w.r. to height and depth from earth, Kepler's Law, Escape and orbital velocity, Time period of satellite, Geo- stationary, Polar satellites.

5. DYNAMICS OF RIGID BODY (ROTATIONAL MOTION) (6 MARKS)

Rigid body, Rotational motion, Moment of inertia, Theorems (Perpendicular and Parallel axis) of moment of inertia (Statement). Expression of M.I. of regular bodies (Lamina, Sphere, Disc, Cylindrical), Concept of Radius of gyration, angular momentum, Conservation of angular momentum, Torque, Rotational kinetic energy. Rolling of sphere on the slant plane. Concept of Fly wheel.

6. FLUID MECHANICS :(5 MARKS)

Surface tension, Capillary action and determination of surface tension from capillary rise method, Equation of continuity ($A_1V_1=A_2V_2$), Bernoulli's theorem, and its application stream line and Turbulent flow, Reynold's number.

7. HARMONIC MOTION (6 MARKS)

Periodic Motion, characteristics of simple harmonic motion; equation of S.H.M. and determination of velocity and acceleration. Graphical representation. Spring-mass system. Simple pendulum. Derivation of its periodic time. Energy conservation in S.H.M.. Concept of

phase, phase difference, Definition of free, forced, undamped and damped vibrations, Resonance and its sharpness, Q-factor.

8. HEAT & THERMODYNAMICS: (6 MARKS)

Modes of heat transfer (Conduction, Convection and Radiation), coefficient of thermal conductivity Isothermal and adiabatic process. Zeroth First, Second Law of Thermodynamics and Carnot cycle, Heat Engine (Concept Only).

9. ACOUSTICS (5 MARKS)

Definition of pitch, loudness, quality and intensity of sound waves. Echo, reverberation and reverberation time. Sabine's formula without Derivation. Control of reverberation time (problems on reverberation time). Acoustics of building defects and remedy.

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I Year I Semester

DAG -104 APPLIED CHEMISTRY

1. **ATOMIC STRUCTURE :**

Basic concept of atomic structure, Matter wave concept, Quantum number, Heisenberg's Uncertainty Principle, Shapes of orbitals.

2. **CHEMICAL BONDING :**

Covalent bond, Ionic & Co-ordinate, Hydrogen bonding, Valence bond theory, Hybridisation, VSEPR theory, Molecular orbital theory.

3. **CLASSIFICATION OF ELEMENTS :**

Modern classification of elements (s.p.d and f block elements), Periodic properties : Ionisation potential electro negativity, Electron affinity.

4. **ELECTRO CHEMISTRY-I:**

Arrhenius Theory of electrolytic dissociation, Transport number, Electrolytic conductance, Ostwald dilution law. Concept of Acid and bases : Bronsted, Arrhenius and Lewis theory. Concept of pH and numerical. Buffer solutions, Indicators, Solubility product, Common ion effect with their application,

5. **ELECTRO CHEMISTRY-II:**

Redox reactions, Electrode potential(Nernst Equation), Electro-chemical cell (Galvanic and Electrolytic). EMF of a cell and free energy change. Standard electrode potential, Electro chemical series and its application. Chemical and Electrochemical theory of corrosion, Galvenic Series. Prevention of corrosion by various method.

6. **CHEMICAL KINETICS :**

Law of mass action, order and molecularity of reaction. Activation energy, rate constants, 1st order reactions and 2nd order reactions.

7. **CATALYSIS :** Definition Characteristics of catalytic reactions, Catalytic promoters and poison , Autocatalysis and Negative catalysis, Theory of catalysis, Application.

8. **SOLID STATE :**

Types of solids (Amorphous and Crystalline), Classification (Molecular, Ionic, Covalent, Metallic), Band theory of solids (Conductors, Semiconductors and Insulators), types of Crystals, FCC, BCC, Crystal imperfection.

9. **FUELS :**

Definition, its classification, high & low Calorific value. Determination of calorific value of solid and liquid fuels by Bomb calorimeter. Liquid fuel - Petroleum and its refining, distillate of petroleum (Kerosene oil, Diesel and Petrol), Benzol and Power alcohol. Knocking, Anti-knocking agents, Octane number and Cetane number. Cracking and its type, Gasolining from hydrogenation of coal (Bergius process and Fischer tropesch's process) Gaseous Fuel - Coal gas, Oil gas, Water gas, Producer gas, Bio gas, LPG and CNG. Numerical Problems based on topics

10. WATER TREATMENT :

Hardness of water, Its limits and determination of hardness of water by EDTA method. Softening methods (Only Soda lime, Zeolite and Ion exchange resin process). Disadvantage of hard water in different industries, scale and sludge formation, Corrosion, Caustic embrittlement, priming and foaming in boilers. Disinfecting of Water By Chloramine-T, Ozone and Chlorine. Advantage and disadvantage of chlorination, Industrial waste and sewage, Municipality waste water treatment, Definition of BOD and COD. Numerical Problems based on topics.

11. COLLOIDAL STATE OF MATTER :

Concept of colloidal and its types, Different system of colloids, Dispersed phase and dispersion medium. Methods of preparation of colloidal solutions, Dialysis and electro dialysis. Properties of colloidal solution with special reference to absorption, Brownian Movement, Tyndal effect, Electro phoresis and coagulation. relative stability of hydrophilic and hydrophobic colloids. Protection and protective colloids. Emulsion, Types, preparation, properties and uses. Application of colloids chemistry in different industries.

12. LUBRICANTS :

Definition, classification, Necessity and various kinds of lubricants. Function and mechanism of action of lubricants and examples. Properties of lubricants, Importance of additive compounds in lubricants, Synthetic lubricants and cutting fluids. Industrial application, its function in bearing.

13. HYDROCARBONS:A. Classification and IUPAC nomenclature of organic compounds homologous series (Functional Group)

B. Preparation, properties and uses of Ethane, Ethene, Ethyne (Acetylene), Benzene and Toluene.

14. ORGANIC REACTIONS & MECHANISM:

1. Fundamental aspects -

- A. Electrophiles and nucleophiles, Reaction Intermediates, Free radical, Carbocation, Carbanion
- B. Inductive effect, Mesomeric effect, Electromeric effect.

2. A. Mechanism of addition reaction (Markovnikov's Rule, Cyanohydrin and Peroxide effect),

- B. Mechanism of Substitution reactions; (Nucleophilic) hydrolysis of alkyl halide, electrophilic substitution halogenation, Sulphonation, Nitration and Friedel-Craft reaction.

C. Mechanism of Elimination reaction - Dehydration of primary alcohol, Dehydrohalogenation of primary alkyl halide.

15. POLYMERS :

1. Polymers and their classification. Average degree of polymerization, Average molecular weight, Free radical polymerization (Mechanisms)
2. Thermosetting and Thermoplastic resins - A. Addition polymers and their industrial application- Polystyrene, PVA, PVC, PAN, PMMA, Buna-S, Buna-N, Teflon. Condensation polymer and their industrial application : Nylon 6, Nylon 6,6, Bakelite, Melamine formaldehyde, Urea formaldehyde, Terylene or Decron, Polyurethanes.
3. General concept of Bio polymers, Biodegradable polymers and inorganic polymers (Silicon)

16. SYNTHETIC MATERIALS :

- A. Introduction - Fats and Oils
 - B. Saponification of fats and oils , Manufacturing of soap.
 - C. Synthetic detergents, types of detergents and its manufacturing.
3. EXPLOSIVES: TNT, RDX, Dynamite.
 4. Paint and Varnish

LIST OF PRACTICALS

1. To analyse inorganic mixture for two acid and basic radicals from following radicals
 - A. Basic Radicals : NH_4^+ , Pb^{++} , Cu^{++} , Bi^{+++} , Cd^{++} , As^{+++} , Sb^{+++} , Sn^{++} , Al^{+++} , Fe^{+++} , Cr^{+++} , Mn^{++} , Zn^{++} , Co^{++} , Ni^{++} , Ba^{++} , Sr^{++} , Ca^{++} , Mg^{++}
 - B. Acid Radicals : CO_3^{--} , S^{--} , SO_3^{--} , CH_3COO^- , NO_2^- , NO_3^- , Cl^- , Br^- , I^- , SO_4^{--}
2. To determine the percentage of available Chlorine in the supplied sample of Bleaching powder.
3. To determine the total hardness of water sample in terms of CaCO_3 by EDTA titration method using Eriochroma black-T indicator.
4. To determine the strength of given HCl solution by titration against NaOH solution using Phenolphthalein as indicator.
5. To determine the Chloride content in supplied water sample by using Mohr's methods.
6. Determination of temporary hardness of water sample by O-Henry's method.

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I Year I Semester
DAG -105 ENGINEERING DRAWING

1. **Drawing, instruments and their uses.** **1 Sheet**
 - 1.1 Introduction to various drawing instruments.
 - 1.2 Correct use and care of Instruments.
 - 1.3 Sizes of drawing sheets and their layouts.

2. (a) **Lettering Techniques** **2 Sheet**

Printing of vertical and inclined, normal single stroke capital letters.
Printing of vertical and inclined normal single stroke numbers.
Stencils and their use.

- (b) **Introduction to Scales** **2 Sheet**

Necessity and use, R F Types of scales used in general engineering drawing. Plane, diagonal and chord scales.

3. **Conventional Presentation :** **1 Sheet**

Thread (Internal and External), Welded joint, Types of lines, Conventional representation of materials, Conventional representation of machine parts.

4. (a) **Principles of Projection** **1 Sheet**

Orthographic, Pictorial and perspective.
Concept of horizontal and vertical planes.
Difference between I and III angle projections.
Dimensconing techniques.

- (b) **Projections of points, lines and planes.** **1 Sheet**

- 5 (a) **Orthographic Projections of Simple Geometrical Solids** **2 Sheet**

Edge and axis making given angles with the reference planes.
Face making given angles with reference planes.
Face and its edge making given angles with reference planes.

- (b) Orthographic views of simple composite solids from their isometric views.
- (c) Exercises on missing surfaces and views

6. **Section of Solids** **2 Sheet**

Concept of sectioning Cases involving cutting plane parallel to one of the reference planes and perpendicular to the others. Cases involving cutting plane perpendicular to one of the reference plane And inclined to the others plane, true shape of the section

7. **Isometric Projection.** **2 Sheet**

Isometric scale
Isometric projection of solids.

8. **Free hand sketching** **1 Sheet**

Use of squared paper Orthographic views of simple solids Isometric views of simple job like carpentary joints

9. **Development of Surfaces** **2 Sheet**

Parallel line and radial line methods of developments. Development of simple and truncated surfaces (Cube, prism, cylinder, cone and pyramid).

10. **ORTHOGRAPHIC PROJECTION OF MACHINE PARTS:** **2 Sheet**

Nut and Bolt, Locking device, Wall bracket

11. **PRACTICE ON AUTO CAD :** **2 Sheet**

Concept of AutoCAD, Tool bars in AutoCAD, Coordinate System, Snap, Grid and Ortho mode. Drawing Command - Point, Line, Arc, Circle, Ellipse. Editing Commands - Scale, Erase, Copy, Stretch, Lengthen and Explode. Dimensioning and Placing text in drawing area. Sectioning and hatching. Inquiry for different parameters of drawing.

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I Year II Semester

DAG-106 AGRICULTURAL SCIENCE

1. Introduction to Crop production related to engineering.
2. Elementary idea of Certain physiological processes, osmosis, photosynthesis, transpiration, evaporation and respiration. Factors affecting these processes.
3. Agronomical Sequences-Monoculture, mixed cropping, multiple cropping, relay cropping; their adoptability advantages and disadvantages.
4. Classification of crops: Detail study of cereals crops (wheat, paddy and maize) legum crops (soybeans, moong and arhar), cash crops (potato, sugarcane), oil seed crops, sunflower (mustard, groundnut) and fruit crops (mango, apple and guava) including production practices, Elementary exposure pest diseases and their control.
5. Identification of weeds & method of weed control for various crops (crops of item 4), Use of weed as green fertilizer and composite material fabrication.
6. Cropping scheme & crop rotation their importance for different agro climatic condition.
7. Plant Propagation : Seed propagations & vegetative propagation, their merits and demerits.
8. Mashroom Cultivation : Introduction and requirements, Method of cultivation.
9. Preparation of bio-insecticides by the use of Neem leaves, Tobacco, Dhatura & other plants.
10. Waste Land Development : Concept and uses.

DAG-106 AGRICULTURAL SCIENCE LAB

List of experiments to be performed.

1. Identification of crops, vegetable seeds & fertilizers.
2. Identification of common weeds, insecticide, fungicide & weed cide.
3. Seed treatment before sowing the crops.
4. Seed bed preparation of sugarcane, potato, maize, Paddey and wheat.
5. Practice of pruning and some vegetative propagation like cutting, budding and air layering.
6. Raised bed farming system (Tatura Sys

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I Year II Semester

DAG -201 APPLIED MATHEMATICS I (B)

1. INTEGRAL CALCULUS - I:

Methods of Indefinite Integration:-

- 1.1 Integration by substitution.
- 1.2 Integration by rational function.
- 1.3 Integration by partial fraction.
- 1.4 Integration by parts.

2. INTEGRAL CALCULUS -II :

- 2.1 Meaning and properties of definite integrals, Evaluation of definite integrals. Integration of special function.
- 2.2 Application : Finding areas bounded by simple curves, Length of simple curves, Volume of solids of revolution, centre of mean of plane areas.
- 2.3 Simposns 1/3rd and Simposns 3/8th rule and Trapezoidal Rule : their application in simple cases.

3. CO-ORDINATE GEOMETRY (2 DIMENSION):

- 3.1 CIRCLE : Equation of circle in standard form. Centre - Radius form, Diameter form, Two intercept form.
- 3.2 Standard form and simple properties
Parabola $x^2=4ay, y^2=4ax,$
Ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$
Hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$

4. CO-ORDINATE GEOMETRY (3 DIMENSION):

- 4.1 Straight lines and planes in space - Distance between two points in space, direction cosine and direction ratios, Finding equation of a straight line and Plane (Different Forms),
- 4.2 Sphere $x^2 + y^2 + z^2 + 2gx + 2fy + 2wz=d$ (Radius, Centre and General Equation)

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I Year II Semester

DAG -202 APPLIED PHYSICS-II

1. Optics :

Nature of light, Laws of Reflection and Refraction, Snell's Law, Interference (Constructive and Destructive), Diffraction and Polarization (Concept Only), Law of Malus and Polaroid's.

2. Introduction To Fibre Optics :

Critical angle, Total internal reflection, Principle of fiber optics, Optical fiber, Pulse dispersion in step-index fibers, Graded index fiber, Single mode fiber, Optical sensor.

3. Lasers and its Applications :

Absorption and Emission of energy by atom, Spontaneous and Stimulated Emission, Population inversion, Main component of laser and types of laser- Ruby Laser, He-Ne laser and their applications. Introduction to MASER.

4. Electrostatics :

Coulomb's Law, Electric field, Electric potential, Potential energy, Capacitor, Energy of a charged capacitor, Effect of dielectric on capacitors.

5. D.C. Circuits :

Ohm's Law, Kirchoff's Law and their simple application, Principle of Wheat Stone bridge and application of this principle in measurement of resistance (Meter bridge and Post Office Box); Carey Foster's bridge, potentiometer.

6. Magnetic Materials and Their Properties:

Dia, Para and Ferro-magnetism, Ferrites, Magnetic Hysteresis Curve and its utility. Basic idea of super conductivity, Meissner's effect.

7. Semiconductor Physics :

Concept of Energy bands in solids, classification of solids into conductors, insulators and semiconductors on the basis of energy band structure. Intrinsic and extrinsic semi conductors, Electrons and holes as charge carriers in semiconductors, P-type and N-type semiconductors.

8. Junction Diode and Transistor :

Majority and Minority charge carriers P-N junction formation, barrier voltage, Forward and reverse biasing of a junction diode, P-N junction device characteristics, Formation of transistor, transistor-action, Base, emitter and collector currents and their relationship LED's.

9. Introduction To Digital Electronics :

Concept of binary numbers, Inter conversion from binary to decimal and decimal to binary. Concepts of Gates (AND, NOT, OR).

10. Non-conventional energy sources:

- (a) Wind energy : Introduction, scope and significance, measurement of wind velocity by anemometer, general principle of wind mill.
- (b) Solar energy: Solar radiation and potentiality of solar radiation in India, uses of solar energy: Solar Cooker, solar water heater, solar photovoltaic cells, solar energy collector.

202 APPLIED PHYSICS-II

PHYSICS LAB

Note: Any 4 experiments are to be performed.

1. Determination of coefficient of friction on a horizontal plane.
2. Determination of 'g' by plotting a graph T^2 versus l and using the formula $g=4\pi^2/\text{Slope of the graph line}$
3. Determine the force constant of combination of springs incase of 1. Series 2. Parallel.
4. To verify the series and parallel combination of Resistances with the help of meter bridge.
5. To determine the velocity of sound with the help of resonance tube.
6. Determination of viscosity coefficient of a lubricant by Stoke's law.
7. Determination of E_1/E_2 of cells by potentiometer.
8. Determination of specific resistance by Carry Foster bridge.
9. Determination of resistivity by P.O.Box.
10. Verification of Kirchhoff's Law.
11. To draw Characteristics of p-n Junction diode.
12. To measure instantaneous and average wind velocity by indicating cup type anemometer/hand held anemometer.

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I Year I Semester
DAG -203 APPLIED MECHANICS

1. Introduction:

Mechanics and its utility. Concept of scalar and vector quantities. Effect of a force. Tension & compression. Rigid body. Principle of physical independence of force. Principle of transmissibility of a force.

2.A. System of Forces :

Concept of coplanar and non-coplanar forces including parallel forces. Concurrent and non-concurrent forces. Resultant force. Equilibrium of forces. Law of parallelogram of forces. Law of triangle of forces and its converse. Law of polygon of forces. Solution of simple engineering problems by analytical and graphical methods such as simple wall crane, jib crane and other structures. Determination of resultant of any number of forces in one plane acting upon a particle, conditions of equilibrium of coplanar concurrent force system.

B. General Condition of Equilibrium:

General condition of equilibrium of a rigid body under the action of coplanar forces, statement of force law of equilibrium, moment law of equilibrium, application of above on body.

3. Moment & couple:

Concept of Varignon's theorem. Generalized theorem of moments. Application to simple problems on levers-Bell crank lever, compound lever, steel yard, beams and wheels, lever safety valve, wireless mast, moment of a couple; Properties Of a couple ; Simple applied problems such as pulley and shaft.

4. Friction:

Types of friction: statically, limiting and dynamical friction, statement of laws of sliding friction, Coefficient of friction, angle of friction; problems on equilibrium of a body resting on a rough inclined plane, simple problems on friction. Conditions of sliding and toppling.

5. Machines:

Definition of a machine. Mechanical advantage, velocity ratio, input, output, mechanical efficiency and relation between them for ideal and actual machines. Law of a machine Lifting machines such as levers, single pulley, three system of pulleys. Weston differential pulley, simple wheel and axle, differential wheel and axle. Simple screw jack, differential screw jack, simple worm and worm wheel.

6. Centre of Gravity:

Concept, definition of centroid of plain figures and center of gravity of symmetrical solid bodies. Determination of centroid of plain and composite lamina using moment method only, Centroid of bodies with removed portion. Determination of center of 'gravity' of solid bodies

- cone, cylinder, hemisphere and sphere, composite bodies and bodies with portion removed.

7. Moment of Inertia:

Concept of moment of inertia and second moment of area and radius of gyration, theorems of parallel and perpendicular axis, second moment of area of common geometrical section : rectangle, triangle, circle (without derivations). Second moment of area for L, T, I and channel section, section of modulus.

8. Beams & Trusses:

Definition of statically determinate and indeterminate trusses. Types of supports. Concept of tie & strut, Bow's notation, space diagram, polar diagram, funicular polygon; calculation of reaction at the support of cantilever and simply supported beams and trusses graphically and analytically; graphical solution of simple determinate trusses with reference to force diagram for determining the magnitude and nature of forces in its various members. Analytical methods: method of joints and method of sections.(simple problems only)

DAG-203 Applied Mechanics Lab : Practical's

1. To verify the law of Polygon of forces.
2. To verify the law of parallelogram and triangle of forces.
3. To verify the law of principle of moments.
4. To find the coefficient of friction between wood, steel, copper and glass.
5. To find the reaction at supports of a simply supported beam carrying point loads only.
6. To find the forces in the jib & tie of a jib crane
7. To find the forces in the members of a loaded roof truss. (King / Queen post truss)
8. To find the mechanical advantage, velocity ratio and Efficiency of any three of the following machines:
 - (i) Simple wheel & axle.
 - (ii) Differential wheel & axle.
 - (iii) Differential pulley block
9. To find out center of gravity of regular lamina.
10. To find out center of gravity of irregular lamina.

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DAG -204 MATERIAL & CONSTRUCTION TECHNOLOGY

1. Non Metallic Materials

(a) **Stone:** Formation of rocks, classification of rocks, quarrying of stones, characteristics and uses of following building stones: Granite, Sand stone, Lime Stone, Marble & Slate.

(b) **Bricks :** Characteristics, classification as per IS, special types of bricks - Fire Bricks, surkhi, brick ballast, general idea of tiles.

(c) **Lime :** Slaking of lime, commercial names, IS classification, characteristics, storage, precautions in handling and uses of lime.

(d) **Cement:** Natural and artificial cement, characteristics of cement, types of cement, their properties and uses. Method of storage, names of different factories of Northern India.

(e) **Timber :** Definition, types - hard wood, soft wood, defects of timber seasoning of timber - water seasoning and kiln seasoning, preservation of timber, market forms of timber, brief study of common Indian timbers, ply wood, hard board and batten boards (only properties and uses.)

(f) **Paints and Varnishes:** Objects of paints & varnishes, types of paints, characteristics, defects, selection of paints, storage of paints. Types of varnishes, characteristics and uses of varnishes.

(g) **Plastics:** Polymers and various composite material, classification, properties, and uses, linoleum, plastic coated paper, polythene sheets, thermocole and PVC.

(2) Metallic Materials

(a) **Ferrous Metals:** Classification of iron. i. Cast Iron : Types as per BIS, their properties and uses. ii. Classification according to carbon contents and as per BIS , properties various steel and uses. iii. Alloy Steel: Effects of various alloying elements, properties of common steel alloy steel.

(b) **Non ferrous Metals:** Basic idea of important ores ,properties and uses of following metals: Alluminium , Zink Copper, Tin and Lead.

(3) **Miscellaneous:** Prop-erties and uses of following materials: Asbestos, cork, felt, gattaparcha, mica, adhesives, bakelite, china clay and fibre glass. Leather, Canvass, Jute, rubber and other advance materials

(B) Construction Methods

- (a) Introduction:** Components of a building, section of a wall showing foundation, footing, D.P.C. , position of doors and windows, ventilators, lintels, flooring, roofing, and parapet etc. and give general idea of terms related to buildings.
- (b) Foundation:** Constructional details of spread footing. (Thumb rules only)
- (c) Brick masonry:** Study of various types of brick bonds with special emphasis on English and Flemish bonds, L, T & Cross junctions.
- (d) Damp Proof Course:** Materials & Method used.
- (e) Doors and windows:** Types and uses of doors, windows and ventilators.
- (f) Plastering and Pointing:** Types and Methods.
- (g) Concrete:** (i) Lime Concrete - Ingredient, specifications, preparation and uses. (ii) Cement Concrete - Ingredient, preparation, laying, compaction, curing, use of local materials as formwork, application of Ferro cement.
- (h) Lintels :** Wooden, RCC and RB lintels.
- (i) Floors:** Common types, construction methods, drainage and cleaning of floors.
- (j) Roofs:** Roofing materials and timber trusses (sheds for cattle and work places. Bamboo structures and its composite (Such as jute, canvas and bamboo sticks and other agricultural Bi products). Composite roof sheets from agricultural waste Materials.

(C) Rural Construction:

- (a) Rural Buildings:** Cattle shed barns, poultry house, grain bin and god owns, their construction details, capacity and functional requirement.
- (b) Rural Sanitation:** Constructional details of septic tank soak pit, aqua privy and PRAI latrines.
- (c) Farm Road :** Kachcha Road, Tar Macadam and Pakka Road.
- (d) Rural Drainage:** Specification as per BIS standards.
- (e) Rural Water Supply :** Construction and working of India Mark -II pump, Over head tank and laying of pipe lines.
- (f) Appropriate technology** for low cost building construction by locally available materials

DAG -204 MATERIAL & CONSTRUCTION TECHNOLOGY LAB

PRACTICAL WORK

1. Identification of different types of stones.
2. Identification of different types of timber.
3. To conduct field test of cement.
4. To determine normal consistency of cement.
5. To determine setting time of cement. (a) Initial setting time (b) Final setting time.
6. To determine water absorption of bricks.
7. To determine compressive strength of brick.
8. To determine fineness of cement by sieve method.
9. To make brick bonds (English and Flemish bonds only)
10. To visit construction sites and write specific report about following activities:
Earth work in foundation, flooring, plastering, pointing, white washing and color washing and installation of India Mark-II pump and Laying of water pipe line.
11. Make a roof sheet at polytechnic agricultural waste material, Cement, coarse sand mixture.

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I Year I Semester

DAG-205 WORKSHOP PRACTICE LIST

1. Carpentry Shop:

- EX-1 Introduction & demonstration of tools used in carpentry shop and different types of joints, types of wood, seasoning and preservation of wood
- EX-2 Planning and sawing practice
- EX-3 Making of lap joint
- EX-4 Making of mortise and tenon joint
- Ex-5 Making of any one utility article such as wooden-picture frame, name plate, etc.

2. Painting and Polishing Shop:

- EX-1 Introduction of paints, varnishes, Reason for surface preparation, Advantage of painting, other method of surface coating i.e. electroplating etc.
- EX-2 To prepare a wooden surface for painting apply primer on one side and to paint the same side. To prepare French polish for wooden surface and polish the other side.
- Ex-3 To prepare metal surface for painting, apply primer and paint the same.
- EX-4 To prepare a metal surface for spray painting, first spray primer and paint the same by spray painting gun and compressor system.

3. Sheet Metal and Soldering Shop:

- EX-1 Introduction and Types of sheets, measuring of sheets
- EX-2 Study and sketch of various types of stakes/anvil.
- EX-3 Introduction & demonstration of tools used in Sheet metal working shop.
- EX-4 Cutting, shearing and bending of sheet.
- EX-5 To prepare a soap case by the metal sheet.
- EX-6 To make a funnel with thin sheet and to solder the seam of the same.
- EX-7 To make a cylinder and to solder the same.

4. Fitting Shop, Plumbing Shop & Fastening Shop:

- EX-2 Introduction & demonstration of tools used in Fitting Shop.
- EX-3 Hacksawing and chipping of M.S. flat. Filing and squaring of chipped M.S. job. Filing on square or rectangular M.S. piece.
- EX-4 Making bolt & nut by tap and die set and make its joints
- Ex-5 To drill a hole in M.S. Plate and tapping the same to create threads as per need.
- EX-6 Utility article-to prepare double open mouth spanner for 18" hexagonal head of a bolt.
- EX-7 Cutting and threading practice for using socket, elbow and tee etc.
- EX-8 Study of bib cock, cistern or stop cock, wheel valve and gate valve etc.
- EX-9 Practice of bolted joints
- EX-10 To prepare a riveted joint
- EX-11 To make a pipe joint

5. Foundry Work

- Ex-1 Study of metal and non metals
- Ex-2 Study & sketch of the foundry tools.
- Ex-3 Study & sketch of cupola & pit furnace.

6. Smithy Shop :

- EX-1 Study & Sketch of Tools used in smithy shop.
- EX-2 To prepare square or rectangular piece by the M.S. rod.
- EX-3 To make a ring with hook for wooden doors.
- EX-4 Utility article-to prepare a ceiling fan hook.

7. Welding Shop :

- EX-1 Introduction to welding, classification of welding, types of weld joints.
- EX-2 Welding practice-gas and electric.
- EX-3 Welding for lap joint after preparing the edge.
- EX-4 Welding of Butt joint after preparation of the edge.
- EX-5 'T' joint welding after preparation of edge.
- EX-6 Spot welding, by spot welding machine.

8. Machine Shop

- EX-1 Study & sketch of lathe machine.
- EX-1 Study & sketch of grinders, milling M/c, Drilling M/c and CNC Machines
- Ex-2 Plain and step turning & knurling practice.
- Ex-3 Study and sketch of planing/Shaping machine and to plane a Rectangle of cast iron.

EVALUATION SCHEME

SEMESTER III

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
DAG -301	Hydraulics	30	70	25	25	150
DAG -302	Soil Mechanics & Soil Sciences	30	70	25	25	150
DAG -303	Surveying & Leveling	30	70	25	25	150
DAG -304	Introduction TO Computer	30	70	25	25	150
DAG -305	Agricultural Equipment Workshop Practice	NA	NA	25	25	50

SEMESTER IV

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
DAG -401	Functional Communication	30	70	NA	NA	100
DAG -402	Mechanics of Solids	30	70	25	25	150
DAG -403	Farm Power Engineering & Non Conventional Sources of Energy	30	70	25	25	150
DAG -404	Electrical Engineering & Rural Electrification	30	70	25	25	150
DAG-405	Agricultural Engineering Drawing	30	70	NA	NA	100
DAG-406	Dairy & Food Engineering	30	70	NA	NA	100

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II Year III Semester
DAG 301: HYDRAULICS

1. Introduction:

- 1.1 Fluid; Real Fluid, Ideal Fluid,
- 1.2 Fluid Mechanics, Hydraulics, Hydrostatics, Hydro kinematics and Hydrodynamics

2. Properties of Fluids:

- 2.1 Mass density, specific weight, specific gravity, cohesion, adhesion, viscosity, surface tension, capillarity, vapour pressure and compressibility

3. Hydrostatic Pressure:

- 3.1 Pressure, intensity of pressure, pressure head, Pascal's law and its applications.
- 3.2 Total pressure, resultant pressure, and centre of pressure
- 3.3 Total pressure and centre of pressure on vertical and inclined plane surfaces:
 - 3.3.1 Rectangular
 - 3.3.2 Triangular
 - 3.3.3 Trapezoidal
 - 3.3.4 Circular

4. Measurement of Pressure:

- 4.1 Atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure.
- 4.2 Piezometers, simple manometer, differential manometer and mechanical gauges.
Measurement of pressure by manometers and pressure gauges.

5. Fundamental of Fluid Flow:

- 5.1 Types of Flow:
 - 5.1.1 Steady and unsteady flow
 - 5.1.2 Laminar and turbulent flow
 - 5.1.3 Uniform and non-uniform flow.
- 5.2 Discharge and continuity equation (flow equation)
- 5.3 Types of hydraulic energy.
 - 5.3.1 Potential energy
 - 5.3.2 Kinetic energy
 - 5.3.3 Pressure energy
- 5.4 Bernoulli's theorem; statement and description (without proof of theorems).
- 5.5 Venturi meter (horizontal and inclined) and Orifice Plate meter.

6. Orifice:

- 6.1 Definition of Orifice, and types of Orifices,
- 6.2 Hydraulic
- 6.3 Large vertical orifices.
- 6.4 Free, drowned and partially drowned orifice.
- 6.5 Time of emptying a rectangular/circular tanks with flat bottom.

7. Flow through Pipes:

- 7.1 Definition, laminar and turbulent flow explained through Reynolds's Experiment.
- 7.2 Reynolds Number, critical velocity and velocity distribution.
- 7.3 Head Losses in pipe lines due to friction, sudden expansion and sudden

contraction entrance, exit, obstruction & change of direction (No derivation of formula)

7.4 Hydraulic gradient line and total energy line.

7.5 Flow from one reservoir to another through long pipe of uniform & composite section.

7.6 Water Hammer Phenomenon and its effects. (only elementary treatment)

8. Flow through open channels:

8.1 Definition of a channel, uniform flow and open channel flow .

8.2 Discharge through channels using

(i) Chezy's formula (no derivation) (ii) Manning's formula

8.3 Most economical sections

(i) Rectangular (ii) Trapezoidal

9. Flow Measurements:

9.1 Measurement of velocity by

(i) Pitot tube (iii) Surface Float (ii) Current-meter (iv) Velocity rods.

9.2 Measurement of Discharge by a Notch

9.2.1 Difference between notches and orifices.

9.2.2 Types of Orifice, Discharge formulae for rectangular notch, triangular Notch, trapezoidal otch, and conditions for their use. (With derivation)

9.3 Measurement of Discharge by weirs.

9.3.1 Difference between notch and weir.

9.3.2 Discharge formula for free, drowned, and broad crested weir with and without end contractions ; velocity of approach and condition of their use.

9.3.3 Venturi flumes to measure flow.

9.4 Measurement of Discharge by velocity area-method.

10. Hydraulic Machines:

10.1 Reciprocating pumps. 10.2 Centrifugal Pumps 10.3 Submersible Pump Sketching and description of principles of working of above mentioned machines.

DAG-301 HYDRAULICS LAB

(i) To verify Bernoulli's Theorem.

(ii) To find out venturimeter coefficient.

(iii) To determine Darcy's coefficient of friction for flow through pipes.

(iv) To determine velocity of flow of an open channel by using a current meter.

(v) Study and sketch any one of the following.

Reciprocating Pump or Centrifugal pump or Pressure Gauge/water meter/mechanical flow meter/Pitot tube.

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II Year III Semester

DAG- 302: SOIL SCIENCE & SOIL MECHANICS

A. SOIL SCIENCE

1 Origin and classification of soils : Origin of soils, weathering of rocks and formation of horizon, composition of soils, structure of soils, classification of soils (based on agricultural needs), IS classification of soil, triangular classification of soil. Distinction between clay, loam & silt. 2

2. Physical proportion of soil: Texture, particle density, structure, bulk density, porosity, air & water in soil, temperature, consistency and organic matter.

3. Chemistry of soils: Soil-water plant relation, soil mineral and chemical classification.(Acid soil, calcareous soil and salion soil) elementary exposure. Method of reclamation of acid & alkaline soil.

4. Introduction to Bio-Fertilizers, its importance.

B. SOIL MECHANICS

5. Introduction: Natural, residual and transported soil. weight volume relationship, determination of soil unit weights, water content and void ratio. Structure of soil: granular and cohesive soil. Soil colloids and Brownian motion.

6. Grain Size distribution: Sieve analysis, Stock's law, hydro- meter analysis (basic concept only), grain size accumulation curves their plotting and interpretation, IS soil classification.

7. Engineering properties of soil:

a. Consistency of soil: Atterburg's limite, method of determination of liquid limit and plastic limit, plasticity index, plotting of flow curve on semi log graph.

b. Permeability of soil: Darcy's law, coefficient of permeability, parameters affecting permeability, determination of permeability by constant and variable head permameters, quick sand condition, seepage through soils.

c. Compaction and consolidation of soil: Concept of compaction and consolidation, difference between them, optimum moisture content, dry density, Procter compaction test, use of optimum moisture content in embankment,

d. Shear strength of soil: Definition of shear strength, Coulomb's law, direct shear box test and shear vane test.

e. Bearing capacity of soil : Definition, net, ultimate and safe bearing capacity, plate load test.

f. Subsurface investigation : Preliminary exploration, tespit, different methods of boring, augers, methods of sampling, sealing of samples, disturbed, representative and undisturbed samples, split spoon sampler.

8. Earth Pressure and Retaining Structures

- 8.1 Definition of earth pressure, active and passive earth pressures, terms and symbols relating to a retaining wall.
- 8.2 Relation between movement of wall and earth pressure
- 8.3 K_a and K_b by Rankin's Method.

9. Shallow and Deep Foundations

- 9.1 Definitions of shallow and deep foundations
- 9.2 Types of shallow and deep foundations
- 9.3 Application of Terzaghi's bearing capacity formula for different types of foundations.

10. Stabilization of Soils by Lime & Cement

- Concept of stabilization, materials used, advantages of lime & cement as stabilizing agents.
- Strength of stabilized soil.

DAG- 302: SOIL SCIENCE & SOIL MECHANICS LAB

LIST OF EXPERIMENTS

A. SOIL SCIENCE:

- 1. Determination of moisture tension with Tension meter.
- 2. Determination of wilting point.
- 3. pH value determination.
- 4. Classification of soil and field identification test.

B. SOIL MECHANICS:

- 5. Determination of grain size distribution by sieve analysis.
- 6. Determination of liquid limit and plastic limit.
- 7. Determination of permeability by constant and variable head permeameter.
- 8. Determination of shear strength by direct shear box test.
- 9. Determination of OMC by Procter compaction test.
- 10. Determination of field density by core cutter method and sand replacement method

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II Year III Semester

DAG-303: SURVEYING AND LEVELLING

1. INTRODUCTION: Definition of Surveying and leveling, purpose, linear and angular units of measurement, instruments used for taking these measurements. Basic principle of Surveying, classification of survey.

2. MEASUREMENT OF DISTANCES: Instruments used, types of chain, chaining of a line, ranging, line ranger, reciprocal ranging, setting out a right angle, optical square, cross staff, offset- right and oblique, errors in chaining, types of errors, correction of length measured by a faulty chain, chaining on sloping ground.

3. CHAIN SURVEY: Definition of terms -Survey station, base line, tie line, check line, running measurement, reference sketch etc. Triangulation of an area, well conditioned triangle, method of booking a survey line, plotting of a survey line, symbols and conventional sign, permissible errors. Obstacles in chain survey.

4. MEASUREMENT OF AREA: Direct measurement of area on paper by planimeter, Simpson's rule, average ordinate rule, trapezoidal rule, enlargement and reduction of a plan, pentagraph and edigraph.

5. COMPASS SURVEY: Purpose, concept of meridians- magnetic, true and arbitrary. Bearing of a line, types of bearing, systems of bearing, fore bearing and back bearing, dip and declination, conversion of bearing from one system to other, calculation of included angles from bearings, calculation of bearings when included angles and bearing of some line is given, local attraction, causes, detection and correction of local attraction, construction, principle and working of prismatic and surveyor's compass. Traversing by compass, closed and open traverse, plotting of a traverse- included angle method and deflection angle method.

6. LEVELLING: Definition of terms, levelling, level and horizontal surfaces. Datum- standard and ordinary, reduced level, bench mark, types of bench marks. Methods of levelling, direct and indirect levelling, their scope and utility. Direct levelling -simple, compound and reciprocal levelling, Levelling instruments, hand level, clinometer, levelling staves, merit and demerits of different types of staves and their use. Levelling field book. Fly levelling and check levelling. Differential levelling and its precision. Profile levelling, longitudinal levelling, cross sectional levelling, plotting of profile. Method of drawing longitudinal and cross section of a channel, drainage and road.

7. PLANE TABLE SURVEY : Plane table and its accessories, adjustments of a plane table, centering, levelling and orientation. Methods of plane tabling- radiation, intersection, traversing

and resection. Errors in plane table survey, advantages and disadvantages of plane table survey.

8. THEODOLITE : Types of theodolyte, different parts of a transit theodolite, different axes of a theodolite, relation between them, temporary adjustment of a theodolite, elementary knowledge of reading bearing by a theodolite.

9. CONTOURING: Definition of contour line, grade contour, horizontal equivalent, vertical interval. Contours of a hill, pond, valley, ridge, vertical cliff, valley line, ridge or water shed line. Method of drawing contours- direct and indirect method of contouring.

10. MINOR INSTRUMENTS: Abney's level, Cylone ghat tracer, Tangent Clinometer.

DAG-303: SURVEYING AND LEVELLING LAB

List of survey Practical's

1. To find out distance between two unapproachable objects.
2. Plan of a small area by means of chain surveying.
3. Plan of a small area by means of compass surveying.
4. Plan of a small area by means of plane table survey.
5. Contour map of an area with atleast 3 meter up and down area.
6. Plan for land acquisition and checking it with sajra plan.
7. To plot the longitudinal section of a canal showing ground level for atleast 1 km length.
8. To determine the elevation difference between two points by levelling with atleast five
Shifting of instruments.
9. To find out bearing with the help of theodolite
10. Use of minor instruments.
11. Calculation of area of a map with the help of plan meter.

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II YEAR III SEMESTER

DAG-304: INTRODUCTION TO COMPUTER

1. INTRODUCTION TO COMPUTER:

A. Block Diagram of Computer B. Types Of Computer C. Types of Input and Output devices
D. Memories Devices (Its Types and Basic)

2. INTRODUCTION TO OPERATING SYSTEMS (MS-DOS/MS-WINDOWS:)

What is operating system, its significance, Commands of DOS, Features/Application of window.

3. WORD PROCESSING:

File : Open, Close, Save, Save as, Search, Send to, Print Preview, Print and Page Setup

Edit : Cut, Copy, Paste, Office Clipboard, Select All, Find, replace, Goto, etc.

View : Normal/Web Layout/Print Layout; Tool Bars; Header/Footer; Zoom, etc.

Insert: Break, Page Number, Date & Time, Symbol, Comment, Reference, etc.

Format: Font, Paragraph, Bullets & Numbering, Borders & Shading, Column, Change case, Background, etc.

Tools : Spelling & Grammar, Language, Word Count, Letters & Mailing, Options, Customize, etc.

Table : Draw, Insert, Delete, Select, Auto Format, AutoFit, Convert, Sort, Formula, etc. Mail Merge

4. WORKSHEET: Introduction, Use of Tools/Icons for preparing simple Mini Project.

5. PRESENTATION: Introduction, Use of Tools/Icons for preparing simple presentation on Power Point.

6. DATABASE OPERATION:

Create database using MS Access, Create Table and Creating Reports.

7. INTRODUCTION TO INTERNET:

What is Network, How to send & receive messages, Use of Search Engines, Surfing different web sites. Creating Mail ID, Use of Briefcase, Sending./replying emails.

8. INTRODUCTION TO ADVANCE TOOLS:

I. Steps requires to solving problems. A. Flow Chart B. Algorithm C. Programming

II. Use of advance Tools such as Skype, Team viewer, Installation of Modem, use of WiFi, Find, replace, Goto, etc.

View : Normal/Web Layout/Print Layout; Tool Bars; Header/Footer; Zoom, etc.

Insert: Break, Page Number, Date & Time, Symbol, Comment, Reference, etc.

Format: Font, Paragraph, Bullets & Numbering, Borders & Shading, Column, Change case, Background, etc.

Tools: Spelling & Grammar, Language, Word Count, Letters & Mailing, Options, Customize, etc.

Table: Draw Insert, Delete, Select, Auto Format, AutoFit, Convert, Sort, Formula, etc. Mail Merge

DAG-304: INTRODUCTION TO COMPUTER LAB

List of Practical's

1. Practice on utility commands in DOS.
2. Composing, Correcting, Formatting and Article (Letter/Essay/Report) on Word Processing tool Word and taking its print out.
3. Creating, editing, and modifying tables in Database tool.
4. Creating labels, report, generation of simple forms in Database tool.
5. Creating simple spread sheet, using in built functions in Worksheet tool..
6. Creating simple presentation.
7. Creating mail ID, Checking mail box, sending/replying e- mails.
8. Surfing web sites, using search engines.

Note : In the final year, related students have to use the concept of MS Word/MS Excel/MS Access/ MS Power Point in their respective branch's project work such as creating project report through MS Word/Creation of statistical data in MS Excel/Creation of database in MS Excel/ Demonstration of project through Power Point Presentation.

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II Year III Semester

DAG-305 AGRICULTURAL EQUIPMENT WORKSHOP PRACTICE

(At least 9 jobs are to be made)

I. MACHINE SHOP:

- | | |
|--|-------|
| 1. Lathe Machine: | |
| (a) Step turning, Taper turning and knurling. | 1 job |
| (b) Drilling, boring, counter boring and internal turning | 1 job |
| (c) V threads cutting (internal and external) | 1 job |
| (d) Multi-thread cutting | 1 job |
| 2. Planer Shaper and Slotter | 1 job |
| 3. Group Work on Milling Machine involving down and climb milling: | |
| (i) Slab milling | 1 job |
| (ii) Gear cutting | 1 job |

II. FITTING SHOP:

- | | |
|--------------------------------|--------|
| (i) To make different keys | 2 jobs |
| (ii) To make Limit gauge | 2 jobs |
| (iii) To make cup and cut tool | 1 job |
| (iv) To grind a drill | 1 job |

III. WELDING SHOP:

- | | |
|--|--------|
| (a) Welding practice on mild steel & Cast Iron | 2 jobs |
| (b) Practice of gas cutting | 1 job |
| (c) Practice on spot welding machine | 1 job |

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II Year IV Semester

DAG-401: FUNCTIONAL COMMUNICATION

Section “A” (English)

Text Lessons

- Unit I. On Communication
- Unit.II Exploring Space
- Unit.III Sir C.V. Raman
- Unit.IV Professional Development of Technicians
- Unit.V Buying a Second Hand Bicycle
- Unit.VI Leadership and Supervision
- Unit.VII First Aid
- Unit.VIII The Romanance of Reading
- Unit.IX No Escape from Computers

Section “B” (Hindi)

- 1& Lojkstxk
- 2& Hkkjrh; oSKkfudksa ,oa rduhfd;ksa dk Hkkjr ds fodkl esa ;ksxnku
- 3& xzkE; fodkl
- 4& ifjokj fu;kstu
- 5& lkekftd laLFkk;sa
- 6& fu;kstu vkSj tu dY;k.k
- 7& Hkkjr esa izkS|Skfxdh ds fodkl dk bfrgkl
- 8& gfjr dzkafUr
- 9& i;kZoj.k ,oa ekuo iznw”k.k
- 10& Jfed dY;k.k
- 11& Hkkjr esa Jfed vkUnksyu

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II Year IV Semester

DAG-402: MECHANICS OF SOLIDS

NOTE: The treatment of subject is limited to simple numerical problems. This subject previously known as "Strength of Materials" has been renamed as "Mechanics of Solids".

1. STRESS STRAIN AND PROPERTIES OF MATERIALS:

Mechanical properties of materials Ductility, Tenacity, Brittleness, Toughness, Hardness, Factor of safety. Different types of loads and stresses, strain in a stepped bar. Determination of stress and elongation of a bolt in a bolted joint when subjected to direct external load only, stresses in compound bars and columns. Equivalent modulus of a compound bar, temperature stresses. Shrinkage of a tyre on a wheel. Temperature stress in compound bar, stress-strain curves for mild steel, Aluminium, cast iron & rubber.

2. COMPLEX STRESSES:

Stresses on an oblique plane in a body subjected to direct load, concept of compound stresses. Principal stress and Principal planes under direct and shear stresses. Graphical determination by Mohr's circle.

3. SHEAR FORCE AND BENDING MOMENT:

Shear force and bending moment for concentrated and uniformly distributed loads on simply supported beams, cantilever and overhanging beam. Shear force and bending moment diagrams. Relationship between shear force and bending moment. Point of contra flexure, calculations for finding the position of contra flexure. Condition for maximum bending moment

4. THEORY OF SIMPLE BENDING:

Simple bending, examples of components subjected to bending such as beam, axle, carriage spring etc. Assumptions made in the theory of simple bending in the derivation of bending formula. Section Modulus Definition of neutral surface and neutral axis and calculation of bending stresses at different layers from the neutral surface for beam of different sections, Pure bending.

5. STRAIN ENERGY:

Meaning of strain energy and resilience. Derivation of formula for resilience of a uniform bar in tension. Proof resilience, modulus of resilience, suddenly applied load, Impact or shock load. Strain energy in a material subjected to uniaxial tension and uniform shear stress. General expression for total strain energy of simple beam subjected to simple bending.

6. TORSION:

Strength of solid and hollow circular shafts. Derivation of torsion equation. Polar modulus of section. Advantages of a hollow shafts over solid shaft. Comparison of weights of solid and hollow shafts for same strength. Horse power transmitted. Calculation of shaft diameter for a given horse power.

7. DEFLECTION:

Deflection of simple cases of cantilever and simply supported beams with concentrated and uniformly distributed loads (standard elementary cases only with no proof of formulae) conditions for circular bending.

8. COLUMNS AND STRUTS:

Definition of long column, short column and slenderness ratio. Equivalent length, Critical load, Collapsing load, End conditions of columns. Application of Euler's and Rankines formulæ (No Derivation). Simple numerical problems.

DAG-402 MECHANICS OF SOLID LAB

1. To find the shear force at a given section of simply supported beam for different loading.
2. To find the value of 'E' for a steel beam by method of deflection for different loads.
3. To determine the Max-Fibre stress in X-section of simply supported beam with concentrated loads and to find the neutral axis of the section.
4. To determine the ultimate tensile strength, its modulus of Elasticity, Stress at yield point, % Elongation and contraction in x-sectional area of a specimen by U.T.M. through necking phenomenon.
5. To determine the ultimate crushing strength of materials like steel and copper and compare their strength.
6. To determine Rock Well Hardness No. Brinell Hardness No. of a sample.
7. To estimate the Shock Resistance of different qualities of materials by Izod's test and charpy test.
8. To determine the bending moment at a given section of a simply supported beam for different loading.
9. To determine the various parameters of helical coil spring
10. To determine the angle of twist for a given torque by Torsion apparatus and to plot a graph between torque and angle of twist.
11. Study of diamond polishing apparatus.
12. Study metallurgical microscope.
13. (a) To prepare specimens for microscope examination (For Polishing and etching).
(b) To examine the microstructure of the above specimens under metallurgical microscope.
(c) To know composition of alloy steel by spebber steeloscope
(d) To know carbon in steel by carbon steel estimation apparatus

14. Preparation of specimens and study of microstructure of eight given metals and alloys on metallurgical microscope. i. Brass. ii. Bronze. iii. Grey Cast Iron. iv. Malleable Cast Iron. v. Low Carbon Steel. vi. High Carbon Steel. vii. High Speed Steel. viii. Bearing Steel.
15. To perform heat treatment process on materials of known carbon percentage -
 1. Annealing 2. Normalizing 3. Case Hardening
16. Mini Project
- i. Collect samples of heat insulating materials
 - ii. Collect samples of various steels and cast iron.
 - iii. Collect sample of Non-Ferrous alloys.
 - iv. Collect samples of Non-Metallic engineering materials

Department Of Agriculture Engineering
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II Year IV Semester

DAG-403: FARM POWER ENGINEERING & NON CONVENTIONAL
SOURCES OF ENERGY

1. INTRODUCTION:

Sources of power on farms, comparative study and uses, limitation and brief description of animal, fossil fuel (Diesel/petrol) wind, solar, Biogas and electrical power.

2. I.C. ENGINES

(a) Principle: Heat engine, principle of operation, classification of I.C. engines, principles of operation two strokes and four stroke cycle Engine. Difference between two stroke and four stroke engine. Diesel and petrol engine, stationary, reciprocating and rotary parts, their material of construction and functions. Concept of terms related with I.C. Engine. Numerical problems related with different terms. Performance of engine.

(b) Engine System : (i) Valve system-Arrangement of valve, Functions of different parts-

Valve timing. Effect of incorrect valve timing. Valve clearance and their adjustment. Firing order. Scavenging systems. Ratio and efficiency.

(ii) Fuel supply systems-System of petrol and diesel engines. Properties of fuel. Fuel filter.

Carburetion. Function of Carburetor. Construction and working of simple, compensating and Zenith carburetor. Adjustments in carburetor. Specific fuel consumption.

(iii) Fuel Injection-Method of injection, construction and working of fuel injection pump, injector atomiser, types of nozzles.

(iv) Air Cleaner - Importance of clean air in engine. Characteristics of air cleaner. Types of air cleaners, their construction and working. Maintenance of air cleaner.

(v) Ignition system - Ignition methods. Electric spark ignition, Battery & Magnetic ignition

system. Spark plug, combustion in I.C. engine, combustion chamber, Silencer.

(vi) Governing system - Governing, hit & miss system, Throttle system, Centrifugal & pneumatic governor. Governor hunting and governor regulations. (vii) Lubricating system - Importance. Function & quality of lubricant. Types of lubricant used in engine. Sources of lubricant. Selection of lubricant. Splash system. Internal forced feed and splash system, full internal forced feed system. Oil filter.

(viii) Cooling System - Importance. methods of cooling - Air cooling, water cooling. Thermo siphon and forced circulating system. Thermo state valve. Antifreeze mixture. Pressure Cooling.

3. TRACTOR :

(a) Introduction: Classification of tractor and adoptability. Factors affecting selection of Tractor. General idea about different makes, models, in different H.P. ranges of tractors.

(b) Tractor Clutches-Necessity, properties of clutch, types of clutches, construction and working of single ,dual and multi plate disc clutches, power transmission by single plate clutch, clutch troubles.

(c) Transmission System-Purpose, gear ratio, types of transmission-Selective gear type and constant mesh type. Differential gear type - construction and working. Final drives, power take-off. Belt-pulleys.

(d) Steering system of wheel tractor.

(e) Tractor brake mechanism.

(f) Hydraulic system of tractor-construction and working.

(g) Hitching system-Drawbar. Principle of hitching, vertical and horizontal hitching adjustments.

3. HOURLY COST OF OPERATION: Hourly cost of operation of small petrol engine, diesel engine and tractor.

5. NON-CONVENTIONAL ENERGY:

(a) Bio-Gas Technology

Introduction to Bio-gas, production to Bio-gas, Bio- digestion of plants and animals waste, reaction taking place during bio-digestion, gases produced during the process, elimination of unwanted gases such as CO_2 and H_2S , factors affecting production of gas, efficiency of Bio-gas plants in winter, uses of biogas, use of digested sludge.

Bio-gas Plant : Construction & working: Main parts of gas plant- digester, gas holder, pressure gauge, gas main controlling cocks and gas meter dimensional details of plant, working of gas plant. Bio-gas application and appliances.

(b) Wind Energy Technology:

Types of Wind Mills-vertical axis and horizontal axis. Various uses of wind mills-lifting water for drinking and irrigation, corn grinding, sewage pumping, electrical power generation. Site selection for a wind mill. Construction of wind mill. Working and maintenance of wind mills.

(c) Solar Energy Technology:

Solar radiation and potentiality of solar radiation in India. Application of solar energy-solar cooker, solar crop dryer, solar water heater and solar Photovoltaic Technology. Solar collector-flat plate collector, concentration or focusing type collector.

**DAG-403: FARM POWER ENGINEERING & NON CONVENTIONAL
SOURCES OF ENERGY LAB**

LIST OF EXPERIMENTS

1. Familiarization with different gauges and controls of tractors and pre starting checks.
2. Tractor driving practice
- (a) Without implements in limited space like L shape, T shape & circle etc.
3. Practice of power tiller operations.
4. Hitching of trailer and different implements. Practice of trailer reversing.
5. Study of components and working of engines; two & four stroke cycle engines
 - (a) With the help of cut way model.
 - (b) Practice of starting, running adjusting and stopping, common trouble shooting.
 - (c) Operation of biogas engine.
6. Study of valve arrangement, valve tuning and firing order. Valve grinding and setting of valve Timing.
7. Study of diesel fuel supply system, air bleeding.
8. Study of battery, periodic battery care, ignition system and spark plug gap adjustment.
9. Study of cooling system in tractors and stationary engines.
10. Study and servicing of Lubrication system.
11. Study of transmission system.
12. Periodic maintenance of engines and tractors.
13. Visit to gobar gas plant and draw its sketch.
14. Study of wind mill

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II Year IV Semester

DAG-404: ELECTRICAL ENGG. & RURAL ELECTRIFICATION

A MACHINES

1. **D.C. Machines:** Principle of operation of D.C. Motor, E.M.F. equation, types and their uses. Principle of operation of D.C. Generators, types & application.
2. **Elements of A.C:** Definition, production of A.C., parameters. Instantaneous values peak, value, R.M.S. Value, Average Value, difference between direct current and alternating current.
3. **A.C. machines:** Principle of operation and application of
 - (i) Alternator
 - (ii) Synchronous motor,
 - (iii) Induction motor
4. **Transformer:** Principle, operation, transformation ratio, application, cooling system.
Types: Step down and step up transformers.
5. **Transmission and Distribution:** Importance, necessity of transmission, transmission losses & how to minimize it. Basic idea about power transmission and substation. Method of distribution of electrical power.
6. **Rural Electrification:**
 1. Electrical appliances: Switches, fuses, regulator boards.
 2. Types of house wiring and wiring materials: wires, battens, conduit pipe (plastic and metal), clips etc.
 3. Wiring tools and equipments.
 4. Calculation of energy consumption and preparation of bills.
 5. Street light connection.
 6. Cables - Utility, specifications and installation with respect to save energy and economy.
 7. General idea about the rules of U.P. Electricity Board for rural electrification.

B MEASURING INSTRUMENTS

1. Working principles and construction of the following instruments:
 - (a) Ammeter and voltmeter (moving coil and moving iron type)
 - (b) Dynamometer type wattmeter
 - (c) Energy Meter
2. Measurement of power in single phase and three phase circuits by wattmeter

DAG-404: ELECTRICAL ENGG. & RURAL ELECTRIFICATION LAB

LIST OF EXPERIMENTS:

1. To Connect a single phase load with single phase supply and measure current, voltage, power and power factor.
2. To study and sketch single phase energy meter and calibrate it at different loads.
3. Stair-case wiring.
4. Study of D.O.L. starter and to connect three-phase motor with it.
5. To study star Delta starter -
 - (a) Manually operated.
 - (b) Automatic type.
6. To measure power and power factor of single phase circuit by a 3 voltmeter method, by 3 ammeter
7. To determine turn ratio and efficiency and regulation of a single phase transformer.
8. Estimation of cost of materials of wiring for a farm house specially battens and conductors wiring.
9. a) Electrical precautions to be strictly observed while working with appliances/equipments/supply lines especially for human safety.
 - b) Knowledge of First-Aid to be provided to the person involved in an accident by electricity.
10. Earthing of electrical equipments.

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II Year IV Semester

DAG-405: AGRICULTURAL ENGG. DRAWING

A. MACHINE DRAWING:

- 1. Introduction:** Concept of half sectional and full sectional views. Concept of working drawing of assemblies from given components showing models of any machine.
- 2. Detail drawings of the following:**
 1. Two views of each, out of which one should be sectional view.
 2. Cotter and knuckle joints
 3. Bearings : Foot step bearing and pedestal bearing
 4. Couplings : Flanged coupling and flexible coupling
 5. I.C. Engine: piston, piston rod and connecting rods
 6. Screw Jack
 7. Free hand proportional sketches of the following agricultural implements and their components:
 - a. Shovel and cultivator
 - b. Simple drum type wheat thresher exploded view.
 - c. Spool for the disc harrow.
 - d. Mould Board Plough, Dis Plough & Reaper Cutter bar

B. CIVIL ENGINEERING DRAWING

Plan, elevation and section of following rural structures:

1. Farm House
2. Cattle barn
3. Poultry farm
4. Doors and windows : braced and battened door, fully panelled door and window, Partially glazed and partially panelled door and window.
5. Drawing of Gobar gas plant of fixed dome type showing different parts and their sizes through visit to a nearby plant.
6. Rural roads and sanitation - cross section of a rural road showing drains and trees etc., plan and section of septic tank and soak pit for a moderate rural family (6 to 10 users) as per BIS specification.
7. Sectional view of India Mark-II Hand Pump.

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II Year IV Semester

DAG-406 DAIRY AND FOOD ENGINEERING

1. INTRODUCTION:

Sanitary features, sanitary pipes and fittings stainless steel pipes, glass pipes, plastic tubing, pipe and fitting standards, sanitary pipe and fitting. Sanitary pumps, centrifugal pump, Positive displacement pump specification, stuffing box, rotary seal.

2. MILK RECEIVING EQUIPMENT/ SOYABEAN MILK:

Weigh can and receiving tank, chilling equipment, weighing and measuring milk standards. Canwashers- principles of operation. Rotary and straight through can washer.

3. STORAGE EQUIPMENT:

Insulated storage tank. refrigerated storage tanks specification for the storage tanks. Milk transport tank. Milk processing equipments, separators-warm, milk separators- cold milk separators, Centrifugals cream separators.

4. HEAT EXCHANGING EQUIPMENT: Heat exchangers.

5. INSTALLATION OF INFLOOR AND ONFLOOR CONVEYOR:

Different types of conveyors used in dairy industry, their drives, take up units. conveyor components, Case stackers and unstackers, platising milk cases, handling of dispenser milk containers, handling of ice cream.

6. ICE CREAM EQUIPMENTS:

Ice cream freezer batch freezer, Continuous freezers, type of designs, air incorporation, over run, control systems, freezing cylinder, dasher, scrapping blades, controls of refrigeration.

7. HOMOGENISERS, SOYABEAN PULP GRINDER:

Theory of homogenization, design, material, single stage and two stage homogenizers, efficiency of homogenization.

8. CREAM, BUTTER AND GHEE EQUIPMENT, PANEER AND TOFFU MAKING:

Cream ripening tanks, design, material, automatic control, operation, cleaning, maintenance of Continuous Butter making equipment. Wooden churn, metal churn. Ghee pan and Ghee making equipments

9. EVAPORATORS & DRYING EQUIPMENTS: Introduction of evaporators, single and multiple operation, Introduction of drum dryer and spray dryer.

B. FOOD ENGINEERING:

Physical properties of food materials, Unit operation in food engineering : Grinding, Crushing, Mixing, Blending, Thermal processing, Dehydration. Packaging materials and methods of packing of different food products. Preservation of food product, site selection and plant layout and their cost economics.

NOTE : For Practical knowledge of above subject one week summer in plant training must be provided in Dairy Plant and report should also be submitted in the department by each student.

EVALUATION SCHEME

SEMESTER -V						
SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
DAG-501	Integrative Communication	30	70	NA	NA	100
DAG -502	Minor Irrigation & Tubewell Engineering	30	70	25	25	150
DAG -503	Post Harvest Technology & Agro Based Industries	30	70	25	25	150
DAG -504	Estimating & Costing	30	70	NA	NA	100
DAG -505	Agricultural, Industrial Finance & Rural Entrepreneurship	30	70	25	25	150
DAG -506	Green House Technology, Hydroponics and Aquaponics Engineering	30	70	25	25	150
SEMESTER -VI						
		THEORY		PRACTICAL		TOTAL
SUBJECT CODE	SUBJECT NAME	SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
DAG-601	Environmental Education & Disaster Mgt	30	70	NA	NA	100
DAG-602	Irrigation & Drainage Engineering	30	70	NA	NA	100
DAG-603	Soil,Water Conservation & Land Reclamation Engg.	30	70	NA	NA	100
DAG-604	R.C.C. & Steel Structures	30	70	25	25	150
DAG-605	Farm & Land Development Machinery	30	70	25	25	150
DAG-606	PROJECT	NA	NA	25	25	50
DAG-607	INDUSTRIAL TRAINING	NA	NA	25	25	50

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III Year V Semester

DAG- 501: INTEGRATIVE COMMUNICATION

[COMMON SUBJECTS]

PERSONALITY DEVELOPMENT:

1. Introduction to Personality Development

AIM, Skills, Types of Skills, Life Skills Vs Other Skills, Concept of Life Skills. Ten core Life Skills identified by WHOM

2. Factors Influencing / Shaping Personality:

Introduction, Physical and Social Factors Influencing / Shaping Personality (Hereditary, Self-Development, Environment, Education, Life-situations) psychological & Philosophical Factors Influencing / Shaping Personality past Experiences, Dreams and Ambitions, Self-Image, Values)

3. Self Awareness – 1

DIMENSIONS OF SELF AWARENESS (Self Realization, Self Knowledge or Self Exploration, Self Confidence, Self Talk, Self Motivation, Self Esteem, Self Image, Self Control, Self Purpose, Individuality and Uniqueness, Personality, Values, Attitude, Character), Self Realization & Self Exploration through Swot Analysis and Johari Window.

4. Self Awareness – 2

Sympathy Vs Empathy and Altruism, Importance of Empathizing with Others,

5. Self Awareness – 3

Self-Awareness through Activity, Body Image (What is Body Image, What Decides our Body Image, What is Poor Body Image, What are the Harmful Effects of Poor Body Image), Tackling Poor Body Image (Enhance Self-Esteem, Build up Critical Thinking, Build up Positive Qualities, Understand Cultural Variation, Dispel Myths, Utilize Life Skills)

6. Change Your Mind Set

What is Mindset, HOW TO CHANGE YOUR MINDSET (Get the Best? Information Only, Make the best people your role Model, Examine Your current Beliefs, Shape Your Mindset with Vision and Goals, Find Your Voice, Protect Your Mindset, Let Go of Comparisons put an End to Perfectionism, Look at the Evidence, Redefine What Failure Means, Stop Worrying About What “People” Think).

INTERPERSONAL SKILLS:

7. Interpersonal Relationship and Communication

INTERPERSONAL RELATIONSHIP, Forms of Interpersonal Relationship Must Have in an Interpersonal Relationship, Interpersonal Relationship between a Man and a Woman (Passion, Intimacy, Commitment), Relationship between Friends, Role of Communication In

Interpersonal Relationship (Take Care of your tone and Pitch, Choice of Words is Important in Relationships, Interact Regularly, Be Polite, Try to understand The Other Person's Point of view as well as, individuals can also communicate through Emails,

8. Non-Verbal Communication Skills

Non-Verbal Communication, We Communicate with Our Eyes, Communication with Facial Expression, a Good Gesture, Appearance, Posture and Gait, Proximity & Touch), IMPORTANCE OF LISTENING, Characteristics of Good and Effective Listener (Is Attentive, Do Not Assume, Listen for Feelings and Facts, Concentrate on the Other Speakers Kindly and Generously, Opportunities)

9. Communication Skills Activities

Activities in Making Collages, Making Advertisements, PPT Preparation & Presentation, Speaking -Seminars, Group Discussions, Debates, Extempore speeches, Listening to an audio clip and telling its gist, Answering a Telephone call, making enquiries, General tips- Pronunciation, Tone, Pitch, Pace, Volume, relevance, brief, simple Reading Newspaper, Magazines (Current Affairs, Economic magazines, Technical magazines), How to read a Report, article, Writing- Resume Writing, Writing joining report, Notice Writing, Report making, Proposal writing, Advertisement, Notice for tender, Minutes writing, E-Mail writing, Listening News, Listening to audio clips.(Lecture, poetry, speech, songs),

10. Body Language skills

Introduction, what is Body Language, Body Language Parts, Personal Space Distances (Intimate Distance, Personal Distance, Social Distance, Public Distance), Important Body language Signs and their meaning

UNDERSTANDING OTHERS:

11. Leadership Traits & Skills:

Introduction, Important Leadership Traits (Alertness, Bearing, Courage, Decisiveness, Dependability, Endurance, Enthusiasm, Initiative, Integrity, Judgment, Justice, Knowledge, Loyalty, Sense of Humor), Other Useful Traits (Truthfulness, Esprit-de-corps, Unselfishness, Humility and sympathy, Tact without loss of moral courage, Patience and a sense of urgency as Appropriate, Self confidence, Maturity, Mental including emotional stability)

12. Attitude

Types of Attitude, **Components of Attitudes** (Cognitive Component, Affective Component, Behavioral Component), Types of Attitudes (Positive Attitude, Negative Attitude, Neutral Attitude, Rebellious Attitude, Rational and Irrational Attitudes, Individual and Social Attitudes), Kinds of Attitude, ASSERTIVENESS, How to Develop Assertiveness (Experiment and try New Things Extend Your Social Circle, Learn to Make Decisions for Yourself, Indulge in Knowledge, Admire Yourself & Others), Negotiation (Be Sensitive To the Needs

Others, Be Willing To Compromise, Develop Your Problem- Solving Skills, Learn to Welcome Conflict, Practice Patience, Increase Your Tolerance for Stress, Improve Your Listening Skills, Learn To Identify Bottom-Line Issues Quickly, Be Assertive, Not Aggressive)

PROBLM SOLVING

13. Analyzing & Solving a Problem skills

Critical Thinking, Creative Thinking, Decision Making, Goal Setting & Planning, Problem Solving

14. Time Management skills

Need of Time Management, TIME WASTERS (Telephone, Visitors, Paper Work, Lack of Planning & Fire Fighting, Socializing, Indecision, TV, Procrastination), PRINCIPLES OF TIME MANAGEMENT - Develop a Personal Sense of Time (Time Log, value of other people's time), Identify Long-Term Goals, Concentrate on High Return Activities, Weekly & Daily Planning (The Mechanics of Weekly Planning, Daily Planning), Make the Best Use of Your Best Time, Organize Office Work (Controlling Interruptions, Organizing Paper Work), Manage Meetings, Delegate Effectively, Make Use of Committed Time, Manage Your Health,

15. Stress Management Skills

introduction, Understanding Stress and its Impact, Expected Responses (Physical, Emotional, Behavioral), stress signals (thoughts, feelings, Behaviors and physical), stress management techniques (take deep breath, talk it out, take a break, create a quiet place in your mind, pay attention to physical comfort, move, take care of your body, laugh, Manage Your Time, Know Your Limits, Do You Have To Be Right Always, Have a Good Cry, Look for the Good Things around You, Talk Less, Listen More) understanding emotions and feelings-through activity

16. Interview Skills (2 sessions from Industry Expert is Compulsory)

Curriculum Vitae (When Should a CV be Used, What Information Should a CV Include, personal profile, Covering Letter, What Makes a Good CV, How Long Should a CV Be, Tips on Presentation), Different Types of CV (Chronological, Skills-Based), before the interview, conducting yourself during the interview, following through after the interview, interview questions to think about, mock interview – activity (mock interview evaluation - non-verbal behaviors, verbal behaviors, general etiquettes to face the board, telephonic interview.

17. Conflict Motives –Resolution

Motives of Conflict (Competition for Limited Resources, the Generation Gap and Personality Clashes, Aggressive Personalities, Culturally Diverse Teams, Competing Work and Family Demands, Gender Based Harassment), Merits and Demerits of Conflict, Levels of Conflict (Interpersonal Conflict, Role Conflict, Inter-group Conflict, Multi-Party Conflict, International Conflict), Methods of Conflict Resolution (The Win-Lose Approach, the Lose-Lose Strategy, the Win-Win Approach), Techniques for Resolving Conflicts (Confrontation and Problem Solving Leading to Win-Win, Disarm the Opposition, Cognitive Restructuring, Appeal to Third Party, the Grievance Procedure)

18. Negotiation / Influencing Skills

Why influencing, what is influencing, types of influencing skills (probing and listening, building rapport, sign posting, pacing, selling, assertiveness), laws and principles of influence, the six laws of influence (the law of scarcity, the law of reciprocity, the law of authority, the law of liking, the law of social proof, the law of commitment and consistency), influencing principles (making a start, buy yourself thinking time, dealing with disagreement, difficult and sensitive situations)

19. Sociability: Etiquettes and Mannerism & Social Skills

Need for Etiquette, Types of Etiquettes (Social Etiquette, Bathroom Etiquette, Corporate Etiquette, Wedding Etiquette, Meeting Etiquette, Telephone Etiquette, Eating Etiquette, Business Etiquette, E-Mail Etiquettes.), mannerisms, how to improve your social skills (Be Yourself, Be Responsible, Be Open & Approachable, Be Attentive, Be Polite, Be Aware, Be Cautious)

20. Importance of Group / Cross Cultural Teams / Team Work skills

Introduction, Types and Characteristics of Groups (Definition of a Group, Classification / Types of Groups, Friendship Group, Task Group, Formal Groups, Informal Group, Effective Group), Importance of a Group, Characteristics of a Mature Group, TYPES AND CHARACTERISTICS OF A TEAM (Definition of team, Types of Teams, Functional Teams, Problem Solving Teams, Cross - Functional Teams, Self - Managed Teams), Importance of a Team, Characteristics of a Team

21. Values / Code Of Ethics

Meaning, a few important values (Honesty, Integrity, Purity, Discipline, Selflessness, Loyalty, Fairness, Equality, Trust, Support, Respect, Etc)

Note: One Orientation module for the faculty is must. Involvement of Industry Experts is necessary for Interview Skills

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III Year V Semester

DAG- 502: MINOR IRRIGATION AND TUBE WELL ENGG.

(A) MINOR IRRIGATION

1. **Introduction:** Importance, necessity and advantages of minor irrigation.
2. **Minor Irrigation & Tubewell Engineering:** Concept, application and scope of minor irrigation & Tubewell engineering.
3. **Planning & Layout:** Planning and layout of minor irrigation channel.
4. **Minor Irrigation Equipments:** Introduction of the following traditional water lifting devices: Swing basket, mhot, rahat, charas, dhenkuli, Egyptian screw, Propeller pump, Axial flow pump.
5. **Water Pumping Equipments:** Wind mills, hydrams, solar water pumps, principles, constructional details & working.
6. **Sources of minor irrigation:** Shallow & deep wells, water tanks and ponds, Confined and unconfined aquifer, development of well.

(B) TUBE WELL ENGINEERING:

1. **Introduction:** Definition of tube well, needs advantages & disadvantages.
2. **Selection of Site:** Characteristics of tube well site, factor affecting site selection.
3. **Drilling Methods:** Types of drilling methods, advantages of different methods. Types of rigs; Rotary & percussion rigs, their construction, installation and working.
4. **Types of Tube well:** Types of tube well, advantages & disadvantages of each type, selection of tubewell for a given site.
5. **Strainers:** Types, method of design, comparison of different types of strainers.
6. **Open Wells:** Design and construction of open wells.
7. **Pump and Pumping equipments:** Types, main features, working principle, selection of pumps and pumping equipment, centrifugal pump, Submersible and turbine pumps, performance, installation and Alignment of centrifugal pump. Submercible pumps, installation, operation and maintenance.
8. **State Tubewells:** Importance in increasing agriculture production, command area and government policy about tubewells.

(DAG- 502: IRRIGATION ENGINEERING LAB)

LIST OF EXPERIMENTS

1. Study and sketch of spill ways and outlet.
2. Study of different types of methods of irrigation adopted for different crops at farmers field.
3. Study and sketch of infiltration and actual determinations of infiltration rate of soil in field.
4. Study and sketch different weirs, notches, orifices and flumes and flow measurement us channel.
5. Determination of discharge of a channel by
 - (a) Float method
 - (b) Current meter method
6. Study and sketch of Tenos meter and its use in determination of soil moisture.
7. To measure pressure head in saturated soil by pizometer.
8. To determine irrigation efficiencies in field:
 - i. Water application
 - ii. Water conveyance
 - iii. water distribution
9. To determine consumptive use by weighing type evapotranspiration pan.
10. Preparation of drainage plans.
11. To determine yield of a tube well.
12. Study and sketch of the following: (Any two)
 - i. Sprinkler Irrigation
 - ii. Drip Irrigation
 - iii. Wind Mill

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III Year V Semester

DAG-503 POST HARVEST TECHNOLOGY & AGRO BASED INDUSTRIES

1. Introduction: Importance of grain and seed processing principles of agricultural processing, sequence of operations, flow diagram, services offered by processor to farmers and Under water grain storage

DIFFERENT STEPS INVOLVED IN SEED PROCESSINGS.

2. Drying:

Importance of moisture in seed and grain representation. Determination of moisture, direct and indirect methods, process of drying such as constant rate period and falling rate period. Drying kinds: thin layer and deep-bed drying. Temperature and air flow requirement, natural air and heated air drying, solar drying. Direct and Indirect dryers, their efficiency and economics.

3. Cleaning and Grading:

Importance, elementary, study of related machines, their operations and maintenance such as scalper, air screen cleaner, rotary cleaner, spiral separator, indented cylinder separator, gravity separator, Debarred.

4. Seed Treatment:

Seed treatment methods, elementary study of seed treating equipments such as powder and slurry seed treater and their advantages.

5. Bagging & Packaging:

Manual bagging, semi-automatic bagging Machines and automatic begging machines. Packaging materials and their utilization

6. Storage:

Storage of seed and grain, respiration and factors affecting it, changes in stored product during storage, loss of germination and seed viability. Design of storage system and equipments. I.S.I. code practice. Storage of fresh fruits, vegetables and dairy products.

7. Material Handling Equipment:

Belt conveyor, screw conveyor, pneumatic conveyor, bucket elevator, their operation and maintenance

8. Pretreatment/Conditioning of Agricultural Produce For Milling:

Parboiling of paddy, Methods and machinery used for parboiling, pretreatment of pulses and oil seeds for milling.

9. Milling of Cereals, Pulses and Oil Seeds & Indian Masalas (Spices):

Methods and machinery used for milling for cereals pulses and oil seeds such as paddy, wheat, arhar and mustared. Elementary knowledge of solvent extraction plant.

10. Canning of Fruits and Vegetables:

Methods and machinery used for canning, advantage of canning.

11. Dehydration of Fruits and Vegetables:

Methods and machinery used for dehydration of fruits and vegetables such frey drier, solam drier, Advantage of dehydration.

12. Processing of Fruits & vegetables For Preparation of Jam, Jelley Squash, Betchup, Etc,

Methods and machinery used for preparation of Jam, Jelly, Squash, Betchup, Catney, Morabba, etc.

13. Utilization of By-Products:

Utilization of paddy husk, rice bran, paddy straw, corn cob; Bio-methanation of fruits and vegetable waste, Classification of agricultural based celulosie materials.

10. Agro-Based Industries:

Sugarcane crushing, khandsari and Gur making process and equipment; Preparation of Soybean and Potato based products such as Soyamilk, Soypaneer, Soybiscuits Papad, chips Wafers, etc.; Briquetting of agricultural waste to use as fuel, Card Board preparation from paddy straw.

DAG-503 POST HARVEST TECHNOLOGY & AGRO BASED INDUSTRIES LAB

PRACTICALS

Study and operation of the following:

1. Air screen cleaner and other cleaning equipments.
2. Heated air dryer.
3. Screw conveyor, bucket elevator & belt conveyer
4. Slurry seed treater and mixer
5. Case Study of the following available in through visits:
 - a. Modern Rice Mill
 - b. Cold Storage/Appropriate technology for short duration storage at village level.
 - c. Specific gravity separator
 - d. Processing and storage plant
 - e. Gur making unit
 - f. Soybean processing unit
 - g. Canning and packaging of fruits and vegetables.
 - h. Khandsari sugar making unit
 - i. Vegetable dehydrating unit
 - j. Seed germinating unit
6. Preparation of Mango, Guava, Karaunda and Apple jelly.
7. Preparation of Orange squash and Lemon squash.
8. Preparation of ketchup of different fruits.
9. Agro waste composite materials

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III Year V Semester
DAG- 504 ESTIMATING & COSTING

1. Introduction:

Definition of estimating, purpose, types of estimate, preliminary estimate, cubical content estimate, plinth area estimate, approximate quantity method estimate, detailed or item rate estimate, revised supplementary estimate, annual repair cost and special repair estimate. Bill of quantities, abstract of cost, prerequisites of estimating that is drawing, specification, rates, general and detailed specifications.

2. Measurement of work:

gas route, Formaldehyde from methanol, Chloromethane by direct chlorination of methane, Trichloroethylene Perchloroethylene by Pyrolysis of carbon tetrachloride, Units of measurement, general rules of taking measurement, units of payment, method of measuring quantities-centre line method, long and short wall or out and in to in methods.

3. Analysis of Rates:

Schedule of rate, need of analysis of rates, requirement of labour for different works as per NBO, requirement of material for different works, preparation of analysis of rate of 10 important works.

4. Estimate of different work of a building & roads & farm structures:

(a) Earth work in foundation, steps, dwarf wall, boundary wall (b) Concrete in foundation (c) Brick masonry in footings (d) Brick masonry upto plinth (e) Brick masonry in super structure (f) D.P.C. (g) R.B. and R.C. works (h) Flooring (i) Sand/earth filling (j) Plastering and pointing (k) White washing and colour washing (l) Site development (m) Antitermite treatment (n) Arches and roofs (o) Water supply and sanitary works: (i) Bath room and W.C. including fittings (ii) Septic tank and soakpit (iii) P.R.A. type latrine (p) Doors and windows (q) Misc. other works 5. Estimate of a complete Village House

6. Calculation of materials:

Calculation of quantities of different materials from estimated quantities of items like brick work, cement concrete R.B. and R.C. work.

7. Estimate of earth work of road:

Calculation of land areas and volumes-Prismoidal formula, mass diagram, methods of taking out and scheduling quantities for various items such as culverts and bunds. Earth work volumes by spot levels and contours.

8. Estimates of irrigation and drainage channels:

Specifications and estimating quantity and cost of irrigation and drainage channels.

(B) MECHANICAL ESTIMATING:

- 1. Estimation of Materials:** Estimation of weight of a simple machine part.,
- 2. Estimation of Welding:** Material cost, fabrication cost, welding cost & finishing cost, overhead cost, labour accomplishment factor and cumulative effects of poor practices on cost. Calculation of cost of welding, gas consumption and welding electrodes.
- 3. Estimation of Forging:** Concept of losses in forging operation. Estimation for the stock required for hard forging considering scale and shear losses.
- 4. Estimation of cost:** Concept of costing, brief discription of direct materials, indirect materials, direct labour, indirect labour and overhead expences

2. C 2 COMPOUNDS

Process Description, flow diagram, Physical Properties and uses of -Ethylene and acetylene
Production by steam cracking of hydrocarbons, Ethylene dichloride, Vinyl Chloride Via ethylene dichloride pyrolysis, Ethylene oxide by oxidation of ethylene, Ethanol amines from ethylene oxide and Ammonia.

3. C3 COMPOUNDS

Process Description, flow diagram, Physical Properties and uses of -Isopropanol by hydration of propylene, Acetone by dehydrogenation of Isopropanol, Acrylonitrile from Propylene Ammonia Oxidation, Isoprene from propylene dimmer, Propylene Oxide via Chlorohydrins.

4 C4 COMPOUNDS

Process Description, flow diagram, Physical Properties and uses of -Butadiene from Dehydrogenation of butane, Butadiene by Oxide hydrogenation, Butadiene from ethanol, Butadiene from steam cracking f hydrocarbons.

5. AROMATICS

Process Description, flow diagram, Physical Properties and uses of -Benzene from Alkyl Aromatics, Phenol by Cumene Process, Phenol from toluene Oxidation, Styrene from benzene and ethylene, Phthalic anhydride by Oxidation of Naphthalene.

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III Year V Semester

**DAG-505 AGRICULTURAL, INDUSTRIAL FINANCE AND RURAL
ENTREPRENEURSHIP**

(A) RURAL DEVELOPMENT

1. Introduction: Importance of rural development, need of development.
2. Spheres of rural development:
(a) Social (b) Education (c) Health (d) Housing (e) Sanitation and drainage
(f) Industrial (g) Energy
3. Govt. agencies involved in rural development: Block Development officer and its staff, Rural engineering department.
4. Financing agencies and their working: Development banks, regional rural bank, Commercial banks, lead bank, cooperative banks.
5. Govt Schemes for rural development: Trysem, IRDP, IRD, ACID (Agriculture credit intensive development scheme), DRI (Differential rate of interest scheme of banks, Insurance schemes.
6. Community Development: Philosophy, principle and objectives, organizational set up of blocks, samiti, Gram vikas samiti etc.
7. Rural Extension: Rural Extension methods such Audio, Visual and Audio Visual. Use and role of information technology in rural development.

(B) ENTREPRENEURSHIP DEVELOPMENT

1. Introduction: Entrepreneur, entrepreneurship, its meaning & importance. Qualities of an entrepreneur. Entrepreneur Motivation Training (E M T). Ring toss, Achievement Planning, Tower Building.
2. Industries: Role and importance of small scale and other Industries. Classification of industries-village industry, tiny industry, small, medium and large scale industry. Ancillary industry. Identification of industry- resources, demand and skill based industry. Financing Agencies for - Land, Infra Structure, Machinery, raw material, import of raw material and machinery. Marketing. Role and function of Govt. department connected with

the development of industries in the State. Component of project report - Land, Building, Electricity, water, Equipment and other utilities. Materials, its availability, cost, labour availability and wage rates. Price of finished product.

3. Market Survey: Project selection based on market survey, demand and supply estimation, fast moving brands etc.

4. Industrial Management: Production planning and control, marketing management and liaison, Basic concept of marketing and salesmanship, marketing mix, working capital management, cash flow. Personnel management. Limiting cost ,budget and its control, book keeping, balance sheet, Break even analysis.

5. Industrial Legislation and Taxes: Industrial and Labour Laws, Production Tax. local tax, sales tax, excise duty, Income tax.

6. Project Report: Project report preparation and provisional registration. Preparation of detailed project report (D.P.R.) for financial assistance.

(C) INDUSTRIAL MANAGEMENT:

1. **Organization:** Definition of good organization. Principle of good organization with merit & demerits.

2.**Lay out:** Site selection of factory, influence of location on plant layout, factors considering for plant building. Definition of plant layout, objectives 2 principles. Types of plant layout.

3. **Material Management:** Importance and function of material handling. Engineering & economics consideration devices. Relation between plant layout and material handling.

4.**Replacement of Machinery:** Reason for machinery replacement. Depreciation, definition different method of calculation depreciation.

5. **Purchase organization:** Importance of good purchasing policy, Function of purchasing Department, Duties of purchasing officer, Purchasing procedure.

6. **Human Resource Management:** Human resource management, selection, performance appraisal, motivation and leadership and controlling.

DAG-505 AGRICULTURAL, INDUSTRIAL FINANCE AND RURAL
ENTREPRENEURSHIP LAB

PRACTICALS

RURAL DEVELOPMENT|

1. Socioeconomic Survey of a village selected in vicinity to polytechnic.
2. To find the problems of the village and suggest the solution in the development of the village from the study of the above survey in respect of :
 - a) Improvement suggested in agricultural activities.
 - b) Rural sanitation problems.
 - c) Rural Housing.
 - d) Energy development.
 - e) Promotion of traditional and other industries.
 - f) Farm mechanization

ENTREPRENEURSHIP DEVELOPMENT:

To prepare a Project report for opening agro based industry and arrange resources for the same from financing agencies.

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III Year V Semester

DAG-506 GREEN HOUSE TECHNOLOGY, HYDROPONIC AND
AQUAPONIC ENGINEERING:

1. INTRODUCTION TO GREEN HOUSE:

Types of green Houses, Environmental requirements in green house, Methods of Environmental control and fixtures, Chemical for control of insects, pest, etc. Soil mixture

2. INTRODUCTION TO HYDROPONIC:

Hydroponic history, use of hydroponic on land and on roofs, Chemical mixtures of hydroponic crops, Lighting fixtures, Infrastructure needs for supporting the hydroponic.

3. INTRODUCTION TO AQUAPONIC:

Basic meaning of aquaponics, The commercial need of aquaponic, use of aquaponic on land and roof, Aquaponic use for production of vegetables and flowers, Aquaponic structures and fixtures.

DAG-506 GREEN HOUSE TECHNOLOGY, HYDROPONIC & AQUAPONIC
ENGINEERING LAB

LIST OF PRACTICALS

1. Construction of green house (Low Cost).
2. Green house with Poly Film based, Glass fibre sheet based, Poly carbonet sheet based covering materials.
3. Green house with different growing mediums.
4. Green house environment maintaining fixtures- cooling, heating system, different type ventilators, etc, lower shutters with exhaust systems.
5. Hydroponics in different pots of shape and sizes and their respective materials.
6. Hydroponic crop growing - capsicum, tomato etc.
7. Aquaponics- Selection of fish and their behavior, their different tank etc.
8. Aquaponic - I. Fixtures like air circulation pump, water circulation pumps, heating system etc. II. Guidelines for recording the material on the Focused Topics in the Record note.

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III Year VI Semester

DAG-601: ENVIRONMENTAL EDUCATION & DISASTER MANAGEMENT

1. INTRODUCTION:

- Basics of ecology, Ecosystem, Biodiversity Human activities and its effect on ecology and eco system, different development i.e. irrigation, urbanization, road development and other engineering activities and their effects on ecology and eco system, Mining and deforestation and their effects. - Lowering of water level, Urbanization.
- Biodegradation and Bio-degradability, composting, bio remediation, Microbes
- Use of bio pesticides and bio fungicides.
- Global warning concerns, Ozone layer depletion, Green house effect, Acid rain, etc.

2. POLLUTION: Sources of pollution, natural and manmade, their effects on living environments and related legislation.

2.1 WATER POLLUTION: Flow Measurement: Hot Wire Anemometry, Laser Doppler Velocity meter, Rota meter Temperature Measurement: Thermometers, bimetallic thermocouples, thermostats and pyrometers. Measurements of Force, Torque: Different types of load cells, elastic transducers, pneumatic & hydraulic systems. Seismic instruments Measurements of Acceleration, and Vibration: Accelerometers vibration pickups and decibel meters, vibro-meters.

- Factors contributing water pollution and their effect.
- Domestic waste water and industrial waste water. Heavy metals, microbes and leaching metal. - Physical, Chemical and Biological Characteristics of waste water.
- Indian Standards for quality of drinking water.
- Indian Standards for quality of treated waste water.
- Treatment methods of effluent (domestic waste water and industrial/ mining waste water), its reuse/safe disposal.

2.2 AIR POLLUTION: Definition of Air pollution, types of air pollutants i.e. SPM, NOX, SOX, GO, CO₂, NH₃, F, CL, causes and its effects on the environment.

- Monitoring and control of air pollutants, Control measures techniques. Introductory Idea of control equipment in industries i.e.

A. Settling chambers

B. Cyclones

C. Scrubbers (Dry and Wet)

D. Multi Clones

E. Electro Static Precipitations

F. Bog Fillers. - Ambient air quality measurement and their standards.

- Process and domestic emission control

- Vehicular Pollution and Its control with special emphasis of Euro-I, Euro-II, Euro-III & Euro IV.

2.3 NOISE POLLUTION: Sources of noise pollution, its effect and control.

2.4 RADISACTIVE POLLUTION: Sources and its effect on human, animal, plant and material, means to control and preventive measures.

2.5 SOLID WASTE MANAGEMENT: Municipal solid waste, biomedical waste, Industrial and Hazardous waste, Plastic waste and its management.

3. LEGISLATION:

Preliminary knowledge of the following Acts and rules made there under-

- The Water (Prevention and Control of Pollution) Act

- 1974. - The Air (Prevention and Control of Pollution) Act - 1981.

- The Environmental Protection (Prevention and Control of Pollution) Act -1986. Rules notified under EP Act - 1986 Viz.

The Manufacture, Storage and Import of Hazardous Chemical (Amendment) Rules, 2000

The Hazardous Wastes (Management and Handling) Amendment Rules, 2003.

Bio-Medical Waste (Management and Handling) (Amendment) Rules, 2003.

The Noise Pollution (Regulation and Control) (Amendment) Rules, 2002.

Municipal Solid Wastes (Management and Handling) Rules, 2000.

The Recycled Plastics Manufacture and Usage (Amendment) rules, 2003.

4. ENVIRONMENTAL IMPACT ASSESSMENT (EIA):

- Basic concepts, objective and methodology of EIA.

- Objectives and requirement of Environmental Management System (ISO-14000)

5. DISASTER MANAGEMENT: Definition of disaster - Natural and Manmade, Type of disaster management, how disaster forms, Destructive power, Causes and Hazards, Case study of Tsunami Disaster, National policy

- Its objective and main features, National Environment Policy, Need for central intervention, State Disaster Authority

- Duties and powers, Case studies of various Disaster in the country, Meaning and benefit of vulnerability reduction, Factor promoting vulnerability reduction and mitigation, Emergency support function plan. Main feature and function of National Disaster

Management Frame Work, Disaster mitigation and prevention, Legal Policy Frame Work, Early warning system, Human Resource Development and Function, Information dissemination and communication.

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III Year VI Semester

DAG-602: IRRIGATION AND DRAINAGE ENGINEERING, RAIN WATER

HARVESTING

1. Introduction:

Definition of Irrigation, History of Irrigation, Necessity & scope of Irrigation, Types of irrigation.

2. Sources of Irrigation Water

Wells, rivers, ponds, canals, tube wells. Investigation and survey, selection of site a determination of capacity of storage reservoirs and tanks.

3. Ground Water:

Water bearing formation, confined and unconfined aquifers, static water level, piezometric surface, pumping water level, drawdown, area of influence, prediction of yield in confined and unconfined aquifer, well development.

4. Water requirement of plants:

Types of soils, soil properties in relation of irrigation and drainage, classes and availability of soil water, preparation of land for irrigation and drainage, quality of irrigation water, evaporation, transportation, evapotranspiration, consumptive use, estimating crop water requirements, duty of water, delta, factors affecting duty methods of improving duty. Assessment irrigation water requirements of different crops, estimation of depth and time of irrigation, different criteria for irrigation scheduling depending upon soil-plant-atmospheric factors.

5. Irrigation Methods & Design of Drip Irrigation System:

Surface and subsurface methods, sprinkler and drip system of irrigation. Design of drip Irrigation system: Laterals and Submain.

6. Storage Structures, Rain Water Harvesting Structures & Methods:

Introduction of different types of dams e.g. earthen dams, rock filled, hydraulic filled etc.

Different types of spillways and outlets, cross sections of earthen dams, causes of failures of earthen dams.

7. Evaluation of Farm Irrigation Systems:

Measurement of irrigation efficiencies, water conveyance, storage, application, distribution and water use efficiency.

8. Soil Moisture Movement:

Soil moisture measurements, soil moisture tension, soil moisture characteristics curve, saturation and field capacity, wilting point, moisture equivalent, percolation, seepage, infiltration, hydraulic conductivity, permeability.

9. Design of Irrigation Channels:

Non-erodible channels, design of open channels, maximum permissible velocity, channel slopes, free board, hydraulic sections, most economical section.

(B) DRAINAGE ENGINEERING:

1. Introduction:

Definition necessity water logging salinity, its control interrelationship of irrigation drainage, drainage coefficient, water table fluctuations.

2. Drainage Investigation & Requirements:

Estimation of drainage requirements, required water table depths, lowering of water table, ground water contours, drainage depths for different crops.

3. Drainage Systems:

Different types of surface and subsurface drainage systems, land smoothing, leveling and grading, design of surface drainage systems, different types of subsurface drainage systems and their design, tile drainage depth and spacing of tile drains, field survey, installation and layout of drains, installation of tile outlets.

4. Special Methods of Drainage:

Vertical drainage, mole drains, drainage of irrigated lands in arid and semi arid areas. Drainage for leaching.

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III Year VI Semester

DAG-603: SOIL WATER CONSERVATION AND LAND RECLAMATION **ENGINEERING**

1. WATER SHED MANAGEMENT:

Concept, objectives, use of remote sensing in water shed management, Planning, Ground water recharging, Water harvesting.

2. RUN OFF & Hydrology:

Definition, phenomenon and forms of runoff characteristics of runoff, factors affecting run off, measurement of run off by float, current meter and weirs, time of concentration and its impact on run off, estimation of peak run off rate by rational equation.

Hydrology : Hydrologic cycle, importance, its components, occurrence and forms of precipitation; Characteristics of rainfall in India, rain fall intensity, measurement of rain fall by non-recording and recording type of rain gauges, method of computing average rainfall, reoccurrence interval.

3. SOIL EROSION

Mechanics, types and causes of erosion, factors affecting erosion, damages caused by soil erosion.

4. SOIL AND WATER CONSERVATION

Definition and aims of soil and water conservation in agriculture, soil conservation survey and land use capability classification, conservation farming.

5. AGRONOMIC MEASURES FOR SOIL & WATER CONSERVATION

Crop classification on the basis of soil conservation value, contour forming, mulching, strip Cropping, cover cropping, mixed cropping, conservation by crop rotation, ley forming, monoculture, role of grasses in soil conservation.

6. MECHANICAL METHODS OF EROSION CONTROL

Elementary idea of basin listing, sub-soiling, field bunding, contour bunding, graded bunding, ridge and channel terraces. Cost of narrow base broad base bund as earthwork and sadding cost.

7. CONSERVATION MEASURES FOR HILL SLOPES:

Contour trenching, specification of trenching, alignment and construction of trenches, bench terracing- types, construction and maintenance, elementary idea of stone terracing and its specification.

8. GULLY EROSION CONTROL & RECLAMATION:

Classification of gullies, principles of prevention and control of gullies by vegetative and mechanical measures, contour and peripheral bunding, ditches, gully plugging. Temporary and permanent structures: Earthen check dams, woven wire check dams, Brush dams, loose rock dams, log and plank dams, straight drop spillway. Reclamation of gullies for cultivation.

9. FORESTRY MANAGEMENT IN SOIL CONSERVATION:

Effects of forests on soil and water conservation and climate, classification of forests, elementary idea of farm and social forestry, Taungya system and forest protection, selection, development, tillage, irrigation protection and management of nurseries, Bamboo Production Methods.

10. GRASSED WATERWAYS:

Use, design of waterways, grasses for waterways, construction of water ways, establishment of grasses on waterways, maintenance of waterways.

11. DRY FARMING:

Definition, climatic classification, elementary idea of various crop management & tillage practices. Land management practices in dry farming eg. Sub-soiling and tied ridging. Water shed based soil and water conservation.

12 WATER CONSERVATION RESERVOIRS:

Types and uses of water conservation reservoirs, site selection & storage capacity of farm ponds, design principles of water harvesting bunds and structures, digging of ponds, construction and maintenance of water conservation structures.

13. FLOOD CONTROL:

Types of flood, damages caused by floods, elementary idea of head water flood control methods.

14. LAND GRADING & LAND LEVELLING:

Water harvesting, Scope, need types, long term and short term water harvesting techniques, design of ponds.

15. WIND EROSION CONTROL: Principles, vegetative and mechanical practices.

16. LAND RECLAMATION: Classification of usar soils, salt resistant crops, reclamation of usar soils. Reclamation of waste lands forest lands and sandy soils, sanddunes stabilization.

17. RAVINE RECLAMATION:

Classification of ravines and various measures for ravine reclamation.

18. COMMAND AREA DEVELOPMENT:

Advantage and disadvantages, Command area development, Component of C.A.D.A.,

Various C.A.D.A. programmes in India.

19. VERMI COMPOST FROM COWDUNG & AGRICULTURAL WASTE

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III Year VI Semester

DAG-604: R.C.C & STEEL STRUCTURES

(A) STEEL STRUCTURES

- 1. Introduction:** Importance, types of loads, structural steel, properties of structural steel, structural steel Section, permissible stresses.
- 2. Structural Connections:** Types of structural connection, strength and design of riveted and welded joints for axially loaded members.
- 3. Tension Member:** Common section used as tension member, strength of tension members.
- 4. Compression Member:** Common section used as compression member, strength of compression members (axially loaded columns & struts). Concept of lacing & battens.
- 5. Beams:** Design criteria, allowable stresses.
- 6. Roof Truss:** Types of trusses for different spans, roof coverings, supports, spacing, loads on trusses.
- 7. Bamboo Trusses**

(B) REINFORCED CONCRETE:

- 1. Introduction:** Behavior and principles, assumptions in R.C. design, designation of concrete mixes, types and need of reinforcement, permissible stresses in concrete and steel, modular ratio, shear & bond stresses. Provision of shear and bond reinforcement. Concept of limit design.
- 2. Singly Reinforced Concrete Beam & slab:** Stress distribution, neutral axis, depth of neutral axis, tensile force, compressive force, lever arm, moment of resistance, actual & critical neutral axis. Types of singly reinforced beam, under, over and balanced sections, analysis of a given section, permissible stresses, design of a singly reinforced beam and slab.

3. **Doubly Reinforced Beam:** Importance of doubly reinforced beam, advantages and disadvantages of use of doubly reinforced beams.
4. **T Beam:** Concept, advantages, calculation of neutral axis, moment of resistance of T beam, reinforcement (no design).
5. **Column and Column footing:** Types of column, effective length, different theory's of design, lateral & transverse reinforcement, lateral ties, spiral/helical or hoop reinforcement, effective area of column, strength of short column, strength of column wounded by spirals, reduction factor. Concept of placement of steel in column footing.
6. **Prestressing:** Definition, basic principle, advantages and disadvantages, method of prestressing, systems of prestressing (Methods only).

DAG-604: R.C.C & STEEL STRUCTURES LAB

LIST OF EXPERIMENT:

1. To determine soundness of aggregates.
2. To determine specific gravity and water absorption of aggregates.
3. Comparative study of compressive strength of concrete for at least 3 different mix under various curing periods.
4. Setting out of a building with two rooms and a verandah.
5. To determine cube strength of concrete.
6. To find slump of a given mix of concrete.

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III Year VI Semester

DAG-605 FARM & LAND DEVELOPMENT MACHINERY

DETAIL CONTENTS:

1. Farm Mechanization

Definition, status of farm mechanization in India, scope, limitations, advantages.

2. Primary Tillage Equipment:

- i) Definition & Functions of tillage, tillage systems, types of tillage, Tillage implements.
- ii) a. Mould Board Plough: Types of mould board plough, construction. Types of share, and Mould board and their material of construction, Concept of sanction, plough size, hitching of plough, point of bearing, Draft, side draft, unit draft, factors affecting draft, forces acting on plough. (Introduction only) Horse power requirements and related numerical problems.
 - b. Disc Plough: Purpose, principles, types, construction and adjustment.
 - c. Other Plough: Chisel, subsurface, rotary plough.
 - d. Ploughing: Concept of terms related with ploughing, Methods of Ploughing.

3. Secondary Tillage equipments:

- a. Harrow: Types, construction and Adjustment repair and maintenance of Animal & tractor driven harrow.
- b. Land Rollers Hackers & Pulveriser: Types construction and operation.
- c. Rotavator and Puddlers

4. Sowing & Planting Equipment:

- a. Pre germinated paddy seeder
- b. Seed Drill/Seed cum Fertilizer Drill: Functions, Types, Construction, detail, size Metering devices, Furrow openers, seed covering devices Calibration of seed drill, and related numerical problems. Field adjustment, repair and maintenance & constructional details. Zero fill ferti drill, Fill plant machine, Strip fill drill Raised bed Planting Machine
- c. Planters: Function, Types, Metering devices, Method of planting. Field advertisement, repair and maintenance. Potato Planter, Sugar Cane Planter, Cotton, Misc. etc. Planter.
- d. Trans-Planter : Paddy transplanter (Manual & self propelled), Vegetable trans-planter.

5. Inter culture and Weed Control Equipment:

- a. Cultivator: Types, Construction, Attachments.
- b. Rotary Hoe: Construction and working.
- c. Flame Weed Control: Construction and working.

6. Fertilizing Equipments:

- a. Manure Spreaders: Construction and working.
- b. Fertilizer Distributor: Construction and working.

7. Plant Protection Equipment:

Types, principles of working, parts and material of constrain, faction and adjustment of sprayer and duster, selection of plant protection equipment, field adjustment, repair and maintenance , safety precaution.

8. Harvesting Equipments:

- a. Mower, Windrower and Reaper Principle of cutting, types, construction working, adjustments, trouble shooting.
- b. Combined Harvester : Types, Construction, Working, Material
- c. Field Forage Harvesters: Types, working adjustment & flow path adjustment, maintenance.
- d. Potato & Groundnut Digger: Construction and working.
- e. Sugarcane Harvester: Construction and working.

9. Threshing Equipments: Types of threshers: Olpad thresher, Power wheat and paddy thresher, working principle, material, flow path, adjustment, repair and maintenance, trouble shooting and precaution.

10. Processing Equipments: Types, Construction and working of the following equipments: Chaff cutter, Sugarcane crusher, Corn sheller, Potato grader and Winnower.

11. Land development Equipments: Construction, operation/working and output of the following: Dozer, Scraper, Power shovel, Drag hoe and Drag Line, scoop, Land Laveller, Land Plane, Laser Land Plane.

12. Field Capacity & Efficiency: Introduction, Concept about Field capacity & Efficiency.

13. Economics, Management and testing of farm equipments

- a. Selection of farm machines and matching equipments of farm needs, break even point, Pay Back Period.
- b. Calculation of cost of operation of farm-machines.
- c. Field capacity & field efficiency.
- d. Farm machinery testing in India. Details of category and field testing of few machines e.g. Seed drill, thresher and plant protection equipments.

14. Garden Equipment: Details of Garden & Horticultural equipments.

15. Raised Bed Preparation Equipment: Use and utility of raised bed preparation equipment.

DAG-605 FARM & LAND DEVELOPMENT MACHINERY LAB

LIST OF EXPERIMENTS:

1. Identifying mould board and disc plough and their parts, assembling & dismantling, measurement of size, sections, angles, setting adjustment.
2. Hitching, field operation, adjustment and measurement of draft, line of pull etc. of a mould board plough.
3. Hitching, field operation and adjustment, measurement of depth and width of ploughing with a disc plough.
4. Identifying harrow and cultivator and their parts, assembling and dismantling, angle setting, hitching, field operation and adjustments.
5. Identifying seed drills, seed cum fertilizer drill and planters and their parts, assembling and dismantling, setting and adjustments.
6. Calibration, field operation and adjustment of seed cum fertilizer drill.
7. Setting, field operation and adjustment of planter and transplanter.
8. Study of power sprayers and dusters different types of nozzles and calibration.
9. Field, operation, setting alignment, registration and other adjustments of a reaper and windrower.
10. Study of chaff cutter and sugarcane crusher.
11. Repair of farm equipment: Ploughs, harrows, Seed drills and weeding tools.
12. Visit of a mechanized farm for study of combine harvester.(Visit Only)
13. Operation of power thresher and safety aspects.
14. Study, sketch and operation of one of the following land development equipment through field visit: Dozer, Scraper, Shovel, Drag hoe and Drag line.

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III Year VI Semester
DAG-606 PROJECT

The project should be taken in close collaboration with the employing agencies. The project shall evolve selection, analysis and solution of special problems related to farm implement, machinery and power/soil and water engineering/ agricultural process engineering applicable to Indian conditions.

The project will be assigned to individual student or to a group of students not exceeding 5 as per problem.

Project will consist of:

- (a) Rural Development
- (b) Demonstration of new techniques for the cultivation of crops, operation of agricultural machinery power tiller and tractors.
- (c) Problem concerning to any one of the following: To run his own workshop for repair and maintenance of agricultural implements. Leveling and Irrigation-Drainage and soil-water conservation needs of farms. To establish an agro based small scale rural industry. Any other problem concerning agriculture. At the end of the project student will submit a written report of his/ their accomplishment and face a viva voce examination individually.

NOTE: (1) Project periods allotted in study scheme per week shall be provided in a stretch at the end of the session.

(2) Two different problems shall be framed by the head of department based on local needs and application in rural areas for technological advancement .

(3) Devices for eliminating pollution and control must be included in the project.

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III Year VI Semester

DAG-607 INDUSTRIAL TRAINING

FIELD EXPOSURE

The final year students will have a four week hands on Industrial Training engaged in units of soil and water conservation training center, minner irrigation, Agro processing unit, construction units. It will be arranged and supervised the institute staff. The industrial exposure can be arranged during the second half of the session before the examination. They will incorporate following points in their report.

1. Name and Address of the unit
2. Date of i. joining. ii. Leaving
3. Nature of Industry i. Product. ii. Services iii. Working Hrs.
4. Sections of the unit visited and activities there in.
5. Details of machines/Tools & instruments used in working in the section of the unit visited.
6. Work procedure in the section visited.
7. Specification of the product of the section and materials used.
8. Control of work & Quality.
9. Inspection procedures packing storing and dispatching of products.
10. Use of computer - if any
11. Visit of unit's store, Manner of keeping store items, their receiving and distribution.
12. Safety measures on work place & working conditions in general comfortable, convenient and hygienic.
13. Pollution, professional deceases and hazards if any. Precautionary measures.